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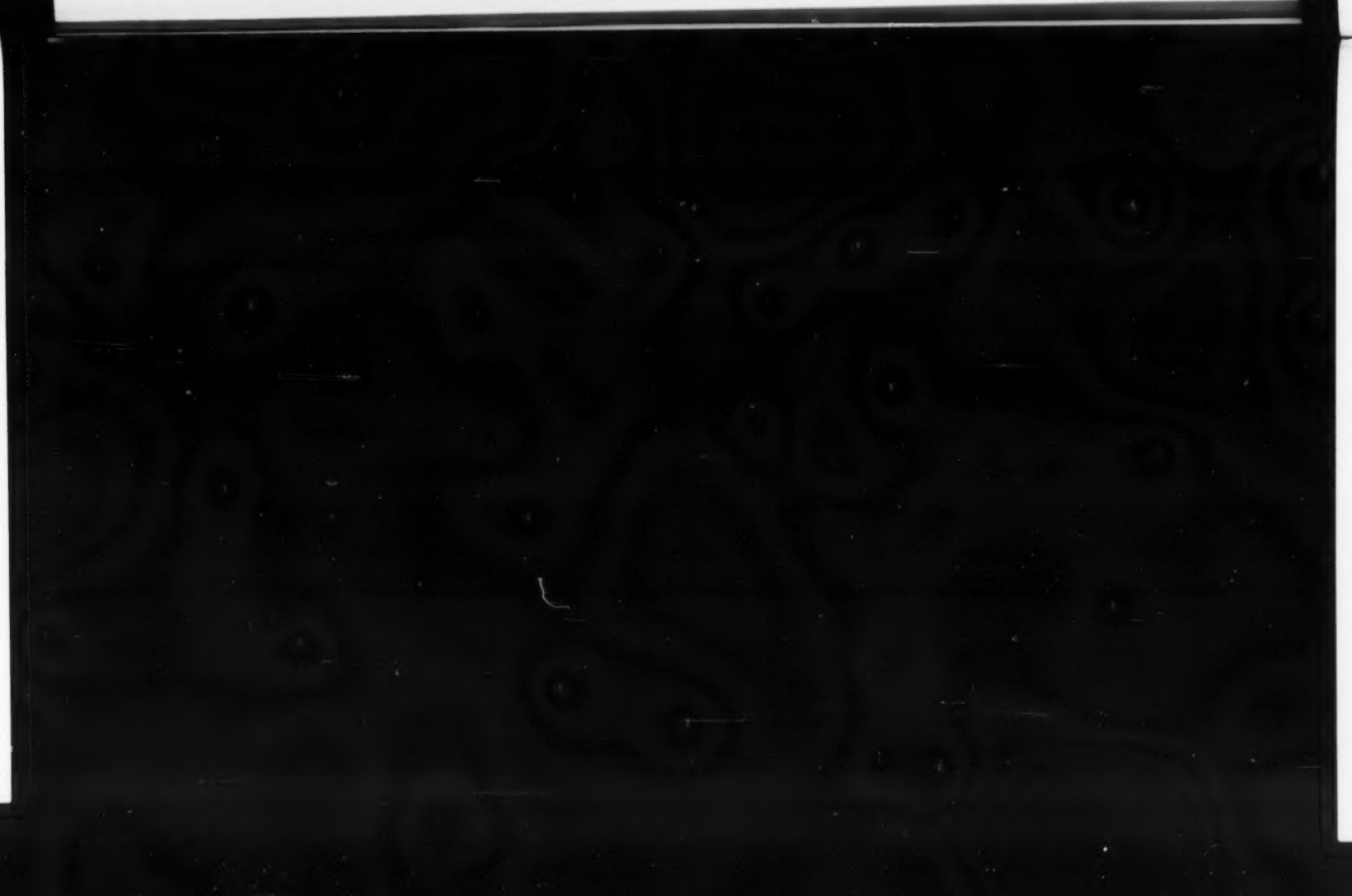

BIRD-BANDING

A JOURNAL OF ORNITHOLOGICAL INVESTIGATION

VOL. XXX JULY, 1959 No. 3

OPERATION RECOVERY—REPORT ON MIST-NETTING ALONG THE ATLANTIC COAST IN 1958

By JAMES BAIRD, AARON M. BAGG, IAN C. T. NISBET, and CHANDLER S. ROBBINS

A summary of the first three years of coordinated netting at Atlantic coastal concentration spots was published in the July 1958 issue of *Bird-Banding* (Baird *et al.*, 1958). The primary purpose of the present paper is to analyze the effects of weather conditions on autumnal migration in 1958 in and near the coastal areas from Nova Scotia to Virginia. Although the daily banding records of the coastal netting stations are the principal sources of information on the composition and magnitude of the major migratory movements, these data have been supplemented by banding records at a few stations away from the coast, by records of casualties at television towers and ceilometer beams, and by direct observations of migration at coastal and inland localities.

We are aware that coastal concentrations are not exactly proportional to the daily magnitude of autumnal migration, for they may be augmented by such effects as coastward drift in offshore winds. The banding data can be used as a good indication of species composition and of relative magnitude of migration at different stations with about the same weather conditions. They can be used also, but less reliably, as a measure of comparative migratory activity under differing weather conditions. Careful analysis of the records, especially comparison of coastal data with inland data, meanwhile may help to evaluate the importance of wind-drift.

Most of the information included in the present report is directly related to the weather and migration analysis: a summary of the 1958 coastal bandings, station summaries, and recoveries. Habitat descriptions, unless specifically mentioned under the station summaries, are essentially the same as in 1957 (Baird *et al.*, 1958). Analysis of repeat data and of weights and measurements will be made in separate papers.

To state that the present report would not have been possible without the wholehearted support of more than 125 banders, observers, recordkeepers and other participants is indeed an understatement. Those who have not participated in this project can hardly appreciate the painstaking detail necessary to the operation of a large-scale field station—especially when each bander is using his own supply of bands. The banders, whose names appear in the Station Summaries, have been most generous and cooperative in making their records available for study. Our thanks also are extended to the many observers, weighers, recordkeepers, and others who assisted in the operation of the larger stations. Mrs. M. Stuart Roesler furnished detailed information on diurnal migratory flights over her home in Cos Cob, Conn., Richard Simmers

supplied counts of thrush calls heard at night in Cambridge, Mass., and David B. Wingate made available his daily records of North American transients in Bermuda. Casualties from the TV towers at Needham, near Boston, Mass., were collected by Bagg. We are indebted to Christopher Packard for information regarding the Portland, Maine, ceilometer accident of September 19-20; and to Floyd P. Wolfarth for data regarding the Newark, N. J., ceilometer casualties of September 19-20. John Conover of Harvard University's Blue Hill Meteorological Observatory has been most helpful in supplying weather information and in preparing Figures 4 and 5; additional meteorological records were provided by the Meteorology Department of the Massachusetts Institute of Technology.

SUMMARY OF 1958 BANDINGS

During the period August 1 through October 31, 20,221 birds of 149 species were banded at the 18 most active stations. Of these birds, 1,299 were taken in traps rather than in nets, and 27 were nestlings; therefore, the total net-hours, 55,471, may be applied only to the 18,857 netted birds.

Because of differences in habitat, weather conditions, type and location of nets, and other factors, accurate direct comparisons cannot be made between stations or between seasons. The following examples illustrate specific situations that preclude precise comparisons: (1) At Island Beach and Tiana Beach the vegetation is hardly higher than the nets, whereas at Milbridge and Middletown many canopy birds are far above netting range; (2) The erecting of nets at additional stations at Nantucket or in additional lanes at Island Beach provides an increase in birds roughly proportional to the number of nets in operation; at Ocean City, on the other hand, doubling the number of nets in the 10-acre woodlot has little effect on the number of additional birds banded; (3) A high percentage of stormy and windy days at Milbridge in 1958 greatly reduced netting efficiency, so a comparison of birds per net-hour does not give a true indication of the relative number of birds each year; (4) As the number of birds present at any banding site varies considerably from day to day (see Weather and Migration), a station such as Chincoteague, which was in operation only during the interval *between* heavy flight days, has a much lower seasonal total in terms of birds per 1,000 net-hours than does a station that also operated during the peak flights; (5) Heavy flights of certain species may occur during a very short period or under unusual combinations of weather conditions; for example, 46% of all the 1958 Baltimore Orioles were banded on a single day, Sept. 9; stations that were not in operation on this day had low seasonal totals for this species.

In spite of the many variable factors that limit direct comparisons it is reasonable to expect that an operation of this size will give some indication of changes in abundance, at least for the more common species. Whether these apparent changes represent actual changes in abundance of the species, or just differences in migration pattern resulting from specific weather conditions, cannot be appraised from the data at hand. However, because many coastal station operators remarked on such things as the scarcity of Catbirds and the abundance of American Redstarts in 1958, comparative figures for the more com-

mon species are presented in Table 1. Three different comparisons are made: (1) total individuals banded; (2) percent of total birds; and (3) birds per 1,000 net-hours. In order to make the figures in Table 1 as nearly comparable as possible, only the August and September bandings are compared for the two years.

Seven of the species shown in Table 1 were banded in greatly reduced numbers during August and September of 1958. Of these, the Catbird is the only one that showed a general decline in all areas. The other six species (Robin, Myrtle Warbler, Savannah Sparrow, Slate-colored Junco, White-throated Sparrow, and Song Sparrow) are primarily October migrants, and in September 1957 they were banded in numbers at just a few of the more northern stations. Their scarcity in September 1958 has no significance other than to suggest a delay in their migration in 1958. That several of these species were not scarce later in the season is demonstrated in Figure 1, which shows that four of the

TABLE 1. *Comparison of 1957 and 1958 August-September bandings*

	Total bandings		Percent of total		Birds per 1,000 net-hours	
	1957	1958	1957	1958	1957	1958
Catbird	1,968	1,492	16.9	11.0	63	30
Song Sparrow	847	674	7.3	5.0	27	14
Swainson's Thrush	677	1,089	5.8	8.0	22	22
American Redstart	626	1,412	5.4	10.4	20	29
White-throated Sparrow	440	296	3.8	2.2	14	6
Yellowthroat	365	660	3.1	4.9	12	13
Savannah Sparrow	363	106	3.1	0.8	12	2
Red-eyed Vireo	285	453	2.5	3.3	9	9
Slate-colored Junco	274	26	2.4	0.2	9	1
Cape May Warbler	263	272	2.3	2.0	8	6
Robin	251	167	2.2	1.2	8	3
Myrtle Warbler	246	95	2.1	0.7	8	2
Rufous-sided Towhee	237	375	2.0	2.8	8	8
Northern Waterthrush	184	486	1.6	3.6	6	10
Gray-cheeked Thrush	180	248	1.5	1.8	6	5
Blackpoll Warbler	156	248	1.3	1.8	5	5
Ovenbird	150	270	1.3	2.0	5	6
Black-and-white Warbler	134	340	1.2	2.5	4	7
Veery	104	389	0.9	2.9	3	8
Baltimore Oriole	103	279	0.9	2.0	3	6
White-crowned Sparrow	7	4	0.1	0.0	0	0

species in question were among the six most commonly banded species for the three-month period, August through October, 1958.

Figure 1 is similar to Figure 3 of the 1957 summary (Baird *et al.*, 1958) in that a different symbol is used for each station where more than 50 individuals were banded. Data from stations with totals of 50 or less are combined in the white areas at the right.

More than 250 individuals of each of the following species were banded during the August through October period of Operation Recovery in 1958: Catbird, 1,560; American Redstart, 1,434; White-throated Sparrow, 1,371; Slate-colored Junco, 1,312; Song Sparrow, 1,254; Myrtle Warbler, 1,249; Swainson's Thrush, 1,205; Yellowthroat, 673; White-crowned Sparrow, 533; Northern Waterthrush, 494; Rufous-sided Towhee, 477; Red-eyed Vireo, 474; Veery, 389; Black-

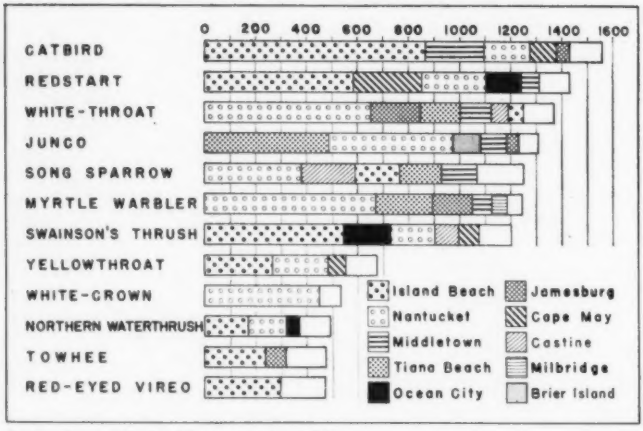

Fig. 1. Station totals for 12 top species, 1958.

and-white Warbler, 365; Blackpoll Warbler, 342; Cape May Warbler, 290; Ovenbird, 285; Gray-cheeked Thrush, 284; and Baltimore Oriole, 280. In 1957 only four species were banded in numbers exceeding 500; in 1958, nine species fell in this category. In 1957 only four species were taken in numbers of 50 or more at four or more stations. In 1958, on the other hand, five species (Catbird, American Redstart, Slate-colored Junco, White-throated Sparrow, and Song Sparrow) were taken in numbers exceeding 100 at four or more stations, and totals for two additional species (Swainson's Thrush and Myrtle Warbler) exceeded 50 at four stations.

The continuation of Operation Recovery bandings into October in 1958 resulted in a much higher percentage of Fringillidae (29.5% instead of 19.8%) and Parulidae (33.9% instead of 28.1%) in the total bandings, and a corresponding decrease in Mimidae (8.8% instead of 18.3%). Percentages for the smaller families did not change more than 1% from 1957, except for a drop in the Icteridae (3.0% instead of 4.5%).

STATION SUMMARIES

The 1957 report (Baird *et al.*, 1958) included a description of each station location as well as a map showing all but the smallest stations. Detailed descriptions are given below for the new stations, but only a brief summary of 1958 activities is given for the others (see also Table 2). Stations were operated daily within the extreme dates shown on the table, except as specified under the individual stations.

BRIER ISLAND, Digby County, Nova Scotia. 44°17′ N, 66°21′ W. Principal species: 104 Slate-colored Juncos* (maximum of 65 on Oct. 19), 33 Myrtle Warblers (14 on Oct. 18). No returns; 6 repeats. Rarities: Brown Thrasher banded, Dickcissel and Western Kingbird seen. Dr. Harrison F. Lewis (station leader), W. J. Mills, and Wickerson Lent (Nova Scotia Bird Society).

*See Appendix for scientific names.

Table 2. *Summary of 1958 operations*

State or province	Locality	Extreme dates	Maximum no. of nets	Total bandings	Total net-hours
N. S.	Brier Island	Oct. 15-Oct. 20	5	209	101
Maine	Milbridge	Aug. 12-Sept. 25	10	253	2,593
Maine	Castine	Sept. 2-Oct. 31	8	840	996
Maine	Medomak	Aug. 16-Sept. 4	6	87	390
Maine	Lisbon	Aug. 30-Sept. 14	5	62	173
Mass.	Gloucester	Aug. 30-Sept. 13	3	71	162
Mass.	Nantucket	Aug. 1-Oct. 31	40	5,665	8,271
R. I.	Middletown	Aug. 1-Oct. 28	18	1,701	6,592
R. I.	Kingston	Aug. 23-Sept. 30	2	273	131
N. Y.	Tiana Beach	Sept. 20-Oct. 31	10	1,507	966
N. J.	Jamesburg	Aug. 1-Oct. 31	8	984	5,550
N. J.	Island Beach	Sept. 5-Sept. 26	124	5,745	16,827
N. J.	Cape May	Sept. 10-Oct. 12	26	972	3,125
Pa.	Tinicum	Aug. 6-Oct. 25	5	182	94
Pa.	Ardmore	Aug. 6-Oct. 31	5	315	553
Md.	Claiborne	Aug. 28-Sept. 17	3	130	699
Md.	Ocean City	Sept. 5-Sept. 21	50	1,122	7,248
Va.	Chincoteague	Sept. 14-Sept. 19	19	103	1,000
Other stations		Aug. 1-Oct. 18		98	137
Totals				20,319	55,608

MILBRIDGE, Washington County, Maine. 44°28′28″ N, 67°51′47″ W. Operated 33 days. Principal species: 59 Myrtle Warblers (7 on Sept. 3), 35 White-throats (8 on Sept. 11), 24 Swainson's Thrushes. Persistent stormy or windy weather limited netting operations. One return; 53 birds repeated a total of 93 times. Mr. and Mrs. G. Hapgood Parks.

CASTINE, Hancock County, Maine. 44°23′ N, 68°50′ W. Peninsula extending into Penobscot Bay from the northeast; Bagaduce River to the east. Principal trees and shrubs: alder, cedar, tamarack, wild crab-apple, blackberry, blueberry. Natural food considered above average; much better than last year, causing much more dispersion of bird population. Operated 44 days. Nets set usually at ground level; at times to height of 12 feet. Principal species: 213 Song Sparrows (46 on Oct. 19), 112 Chipping Sparrows (29 on Oct. 8), 94 Swainson's Thrushes (20 on Sept. 14). No returns; 9 individuals repeated. Rarities: Clay-colored Sparrow, Saw-whet Owl, Barred Owl. Lt. and Mrs. M. C. Morse, Jr.

MEDOMAK, Lincoln County, Maine. 43°56′ N, 69°24′ W. Operated 10 days. Little evidence of waves. Principal species: 13 Song Sparrows. Four returns; 1 repeat. Rarity: Yellow-breasted Chat. Joseph M. Cadbury.

LISBON, Androscoggin County, Maine. 44°04′ N, 70°05′ W. Operated 11 days. Principal species: 12 White-throated Sparrows (8 on Sept. 14). Douglass H. Morse.

GLOUCESTER, Essex County, Massachusetts. 42°35′ N, 70°39′ W. Operated 9 days, August 30 to Sept. 13. Two returns; 9 birds repeated a total of 20 times. Mrs. Sarah F. Robbins.

NANTUCKET ISLAND, Nantucket County, Massachusetts. 40° N, 70° W (several locations). Operated 67 days. Principal species: 672 Myrtle Warblers (198 on Oct. 13), 656 White-throated Sparrows (105

on Oct. 13), 487 Slate-colored Juncos (83 on Oct. 13, 79 on Oct. 6), 452 White-crowned Sparrows (87 on Oct. 17), 382 Song Sparrows (20 on Sept. 25), 256 American Redstarts (31 on Sept. 23), 220 Yellowthroats (20 on Aug. 17). Rarities: Worm-eating, Golden-winged, Blue-winged, Orange-crowned, Mourning, and Hooded Warblers, Blue Grosbeak, Dickcissel, Lark and Clay-colored Sparrows. John V. Dennis (station leader), Mrs. Roy E. Larsen, Mrs. Edith Andrews, Dr. Lee J. Whittles, John Boyd, Elizabeth Van Duyne, Mabel Depue, Mr. and Mrs. Philip Heywood, Mr. and Mrs. E. A. Bergstrom, Mrs. Stanley S. Dickerson, Frank Frazier, Jr. (Nantucket Ornithological Research Station).

MIDDLETOWN, Newport County, Rhode Island. 41°30′ N, 71°20′ W. Norman Bird Sanctuary. Includes 3 days on Block Island, R. I., October 11-13. Operated 62 days. Principal species: 234 Catbirds (22 on Sept. 20), 140 Song Sparrows (14 on Oct. 14), 124 White-throated Sparrows (43 on Oct. 13, Block Island), 115 Yellow Warblers (25 on Aug. 4), 104 Slate-colored Juncos (64 on Oct. 13, Block Island). Rarities: Western Kingbird, Orange-crowned Warbler, Kentucky Warbler, Dickcissel. James Baird (station leader), Ralph O. Udall, Mrs. James Baird.

KINGSTON, Washington County, Rhode Island. 41°2-′ N, 71°2-′ W. Operated 13 days. Principal species: 78 American Goldfinches (14 on Sept. 13), 31 Catbirds (8 on Sept. 20). Six returns (all Black-capped Chickadees); 17 repeats. Douglas L. Kraus.

TIANA BEACH, Shinnecock Bay, Suffolk County, Long Island, New York. 40°49′ N, 72°32′ W. Outer beach near Tiana Coast Guard Station (7 miles west of Southampton). This barrier beach is only 180 yards wide from bay to ocean at the Coast Guard Station, where the nearest nets were 80 yards from the ocean. The best location was a lane 2,000 feet west of the Tiana Coast Guard Station, in a clump of low pines (maximum height 10 feet) about 90 feet by 100 feet, where nets were 225 yards from the ocean. This lane was long enough for only 3 nets, with the balance of the beach between pines and ocean covered only by short beach grass. On the peak day, Oct. 31, one net in this lane caught 30 birds in 30 minutes. Four to 10 nets, running north-south, operated on 14 days. Principal species: 490 Slate-colored Juncos (118 on Oct. 31), 223 Myrtle Warblers (100 on Oct. 18), 165 Song Sparrows (35 on Oct. 30), 157 White-throated Sparrows (62 on Oct. 31). No station returns; 128 repeats. Rarities: Sage Thrasher, Dickcissel, Red-headed Woodpecker. LeRoy Wilcox (station leader), Walter Terry.

JAMESBURG, Middlesex County, New Jersey. 40°2-′ N, 74°2-′ W. Jolian Farm. Principal species: 189 White-throated Sparrows (28 on Oct. 24), 158 Myrtle Warblers (17 on Oct. 14), 80 Rufous-sided Towhees (7 on Oct. 9). Mrs. Joseph Cardinali.

ISLAND BEACH, Ocean County, New Jersey. 39°46′ to 39°54′ N, 74°05′ W. Principal species: 864 Catbirds (130 on Sept. 6, 100 on Sept. 12); 583 American Redstarts (149 on Sept. 20), 546 Swainson's Thrushes (168 on Sept. 20, 100 on Sept. 9), 298 Red-eyed Vireos (96 on Sept. 20), 266 Yellowthroats (46 on Sept. 6), 239 Rufous-sided Towhees (36 on Sept. 13), 173 Veeries (92 on Sept. 9), 170

Song Sparrows (28 on Sept. 12), 165 Northern Waterthrushes (32 on Sept. 9). Thirty-seven returns; 709 repeats. Rarities: Blue Grosbeak, Clay-colored Sparrow, Lark Sparrow. Mrs. Stanley S. Dickerson (station leader), Stanley S. Dickerson, Bennett K. Matlack, William Pepper, Frank Frazier, Sr., Frank Frazier, Jr., John Given, Mrs. Frank Townsend, John C. Miller, Mr. and Mrs. Albert Schnitzer, Stephen Harty, LeRoy Wilcox, Richard Riesz, Darwin Wood, Joseph R. Jehl, Jr., Mrs. Mabel Warburton, Mrs. Earl Smith, Mr. and Mrs. John Schmid, Mr. and Mrs. Herman Kuch, Mrs. Marie Dumont, G. Dumont, L. Dumont, Gilbert Raynor, Bertram G. Murray, Jr., Michael Logue, Stanley Quickmire, John Dornan, Mr. and Mrs. John Frankenfield, Peter Westcott.

CAPE MAY POINT, Cape May County, New Jersey. 38°56′14″ N, 74°57′10″ W. Wetherbee Woods. Operated daily, Sept. 10-21 and Oct. 11-12. Area was sprayed from one to three times daily in September. Principal species: 266 American Redstarts (88 on Sept. 19), 102 Catbirds (22 on Sept. 19), 80 Swainson's Thrushes (27 on Sept. 20). Eleven returns; 33 repeats. Seth H. Low (station leader), George Hitchner, M. S. Cottrell, Pete Davis.

TINICUM WILDLIFE PRESERVE, Philadelphia, Pennsylvania. 39°5-′ N, 75°1-′ W. Operated 23 days. Principal species: 49 Song Sparrows (12 on Sept. 29), 35 Semipalmated Sandpipers (19 on Aug. 13), 31 Savannah Sparrows (10 on Oct. 13). John C. Miller.

ARDMORE, Montgomery County, Pennsylvania. 40°00′ N, 75°17′ W. Includes 95 birds taken in traps. Operated 65 days. Principal species: 50 White-throated Sparrows (19 on Oct. 19), 37 Catbirds, 35 Robins. Eleven returns; 55 birds repeated a total of 113 times. Dr. E. Wayne Marshall.

CLAIBORNE, Talbot County, Maryland. 38°50′ N, 76°18′ W. Principal species: 24 American Redstarts (9 on Sept. 12), 13 Tennessee Warblers (5 on Sept. 4). One return; 4 birds each repeated once. W. M. Davidson.

OCEAN CITY, Worcester County, Maryland. 38°24′25″ N, 75°03′45″ W. Principal species: 186 Swainson's Thrushes (77 on Sept. 9), 137 American Redstarts (27 on Sept. 9), 94 Veeries (59 on Sept. 9), 82 Baltimore Orioles (57 on Sept. 9). Two returns; 637 repeats. Chandler S. Robbins (station leader), Mrs. Richard D. Cole, Mrs. M. B. Peacock, Arthur H. Fast, Mr. and Mrs. A. J. Fletcher, Gordon Knight, Mr. and Mrs. Edgar Reynolds, Mrs. E. W. Goodpasture, Mr. and Mrs. Carl Lubbert.

CHINCOTEAGUE National Wildlife Refuge, Accomack County, Virginia. 37°54′30″ N, 75°21′15″ W. Principal species: 26 Pine Warblers (20 on Sept. 17); 15 American Redstarts (5 on Sept. 19). One return; 1 repeat. Frederic R. Scott.

OTHER ATLANTIC COASTAL STATIONS. Netting was conducted on 1 to 4 days at the following stations: Kent Island, New Brunswick, 6 birds in 18 net-hours by C. E. Huntington and D. W. Matheson; Rockaway Beach, Long Island, New York, 58 birds in 11 net-hours by P. A. Buckley, P. W. Post, W. Cashman; New Lisbon, New Jersey, 31 birds in 90 net-hours by J. M. Cadbury; Morehead City, North Carolina, 3 birds in 48 net-hours by Dr. Charles H. Blake.

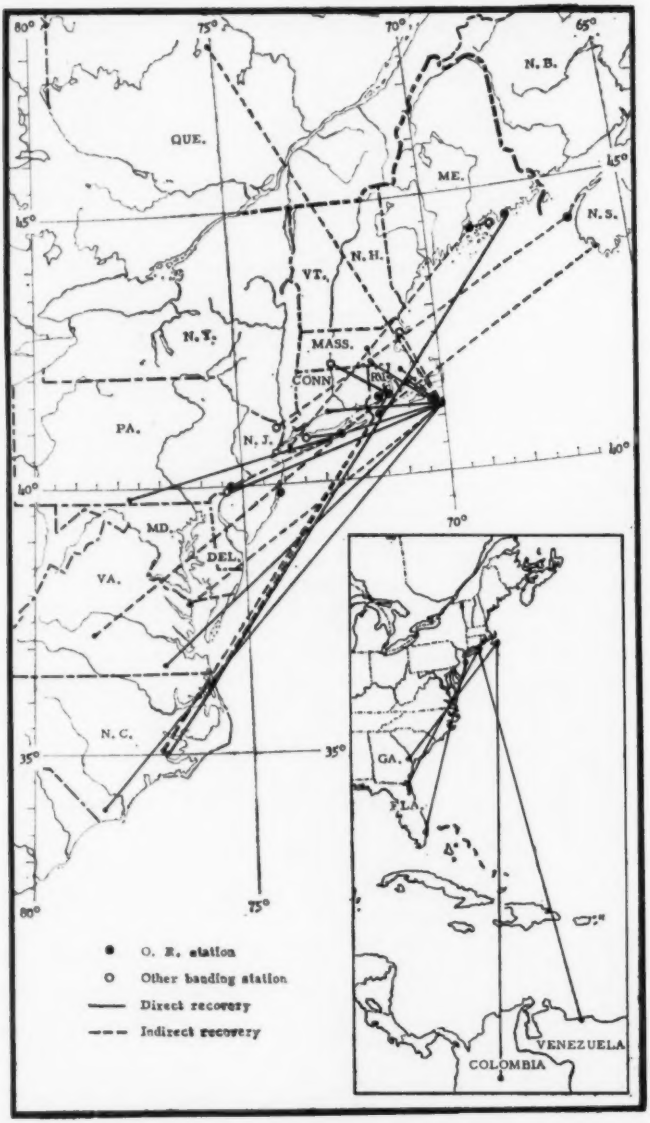

Fig. 2. Additional recoveries of Operation Recovery birds.

STATIONS AT INLAND AND GULF LOCALITIES. Intensive netting operations were conducted at Point Pelee, Ontario (Dow, 1959), and at the Cedar Grove Ornithological Station on the Wisconsin shore of Lake Michigan (Mueller, 1959). Preliminary operations were conducted at several other stations, including the Michigan shore of Lake Michigan (Lawrence H. Walkinshaw), Bear Rocks on the Allegheny Front in West Virginia (Ralph K. Bell *et al.*), and the entrance to Mobile Bay, Alabama (Thomas A. Imhof *et al.*). As these localities are outside the geographic scope of the weather analysis of the present paper, further details of the inland and Gulf Coast bandings will not be presented here. It is hoped that series of netting stations similar to the one along the Atlantic Coast can be in operation in several other parts of the continent in the fall of 1959.

RECOVERIES

Direct recoveries of birds from Operation Recovery in 1955, 1956, and 1957 were listed and mapped in the 1957 report (Baird *et al.*, 1958). Although direct recoveries (those retaken in another locality during the same fall or winter) are of primary interest to the banders, indirect recoveries (those from subsequent seasons) can furnish valuable clues to the approximate origin of birds banded at coastal localities. The origin of coastal migrants takes on increasing significance as understanding of the relation between weather and migration becomes more refined.

Additional recoveries of 1957 birds as well as those available for 1958 birds as of April 10, 1959, are listed in Table 3 and illustrated in Figure 2. The distribution pattern of these birds is quite similar to that of the birds mapped in the 1957 report. Of the 11,613 birds banded in the 1957 operation, 12 (0.10%) furnished direct recoveries and 6 others (total of 0.15%) were recovered during the first 12 months after banding. Recoveries of birds banded at Castine, Nantucket, Middletown, and Kingston after the dates given in Table 1 of the 1957 report are not included in these percentages.

The total number of recoveries to date from each year's bandings (including October, 1957) is as follows: 1 from 1955, 1 from 1956, 30 from 1957, and 10 from 1958. In addition, two birds previously banded by inland banders were captured at coastal netting stations in 1958.

WEATHER AND MIGRATION

Introduction.

Analysis of records from the 1957 bandings in Operation Recovery showed that most good periods of migration came one or two days after the passage of a cold front across the Northeast. The second day often produced the greatest density of migrants, especially when an area of general precipitation followed passage of the front (Baird *et al.*, 1958). A number of exceptions to this generalization were noted, however, and it was found that certain species did not figure prominently in the main migration waves of the more common species.

As the Operation Recovery program expands, it becomes possible to examine these anomalies in more and more detail. The analysis that follows will be concerned mainly with extension and qualification of

Table 3. *Additional recoveries of Operation Recovery birds*

Species	*Band number*	*Banding date*	*Banding locality*	*Bander*	*Recovery date*	*Recovery locality*	*Elapsed time (days)*
Yellow-shafted Flicker	563-48655	9/17/57	Nantucket, Mass.	Whittles	5/15/58	Clova, Que.	239
Catbird#	56-158350	10/ 5/57	Kingston, R. I.	Kraus	about 2/10/58	Jacksonville, Fla.	128±
Wood Thrush	56-120536	9/19/57	Middletown, R. I.	Baird	late summer 1958	Boylston, Mass.	350±
Cedar Waxwing	24-189121	9/ 4/57	Middletown, R. I.	Baird	4/24/58	New Bern, N. C.	232
Brown-headed Cowbird	55-101439	9/ 6/57	Nantucket, Mass.	Whittles	3/28/58	Middleboro, Mass.	203
Brown-headed Cowbird	55-101463	9/ 6/57	Nantucket, Mass.	Whittles	about 2/25/58	East Douglas, Mass.	142±
Brown-headed Cowbird*#	53-178740	10/22/57	Nantucket, Mass.	Dennis	4/13/58	Beverly Farms, Mass. by Samuel Cabot, Jr.	173
Purple Finch*	55-71752	10/ 1/57	Castine, Maine	Morse	5/22/58	Mount Desert, Me. by Mrs. R. Patterson	233
Slate-colored Junco*	22-46660	9/22/57	Brier Is., N. S.	Lewis	4/20/58	Ramsey, N. J. by Mrs. J. Y. Dater	210
Chipping Sparrow#	27-51162	10/13/57	Block Is., R. I.	Baird	10/20/58	Upper W. Pubnico, Nova Scotia	372
White-throated Sparrow*#	25-177097	10/ 3/57	Nantucket, Mass.	Larsen	11/ 6/57	Glenolden, Pa. by Mrs. John Gillespie	34
White-throated Sparrow#	25-176908	10/ 2/57	Nantucket, Mass.	Larsen	1/ 6/58	Hallsboro, N. C.	96
White-throated Sparrow#	24-189599	10/23/57	Middletown, R. I.	Baird	4/11/58	Coinjock, N. C.	170
White-throated Sparrow#	24-189327	10/ 3/57	Middletown, R. I.	Baird	2/15/59	Pamplin, Va.	500
Song Sparrow	23-115448	10/ 5/57	Castine, Maine	Morse	3/24/58	Queens Village, N. Y.	170
Song Sparrow	26-102040	8/28/57	Nantucket, Mass.	Andrews	12/26/58	Harryhogan, Va.	485
Pigeon Hawk	514-09953	9/20/58	Island Beach, N. J.	Dickerson	12/ 8/58	Delray Beach, Fla.	79

Yellow-bellied Sapsucker	26-185831	10/ 6/58	Nantucket, Mass.	Frazier, Jr.	about 3/ 2/59	Clyo, Ga.	147±
Robin	532-21698	9/20/58	Milbridge, Me.	Parks	12/17/58	Bridgeton, N. C.	88
Swainson's Thrush	26-171230	9/21/58	Nantucket, Mass.	Larsen	prior to 12/11/58	Moniquirá, Colombia	81—
Northern Waterthrush*	61-67303	9/27/58	Tiana Beach, N. Y.	Wilcox	11/29/58	Caracas, Venezuela by Paul Schwartz	63
Baltimore Oriole*	55-117507	6/30/58	Springfield, Mass.	W. A. Tompkins	9/ 6/58	Middletown, R. I. by Baird	67
Common Grackle	623-35727	9/17/58	Nantucket, Mass.	Larsen	1/15/59	Franklin, Va.	118
Brown-headed Cowbird	56-157305	9/13/58	Nantucket, Mass.	Dennis	10/27/58	Branford, Conn.	44
Slate-colored Junco	28-81401	10/ 7/58	Nantucket, Mass.	Frazier, Jr.	letter of 10/31/58	New Bedford, Mass.	24—
Slate-colored Junco*	61-94225	10/30/58	Tiana Beach, N. Y.	Wilcox	2/27/59	Huntington, L. I., N. Y. by G. Gill	120
White-crowned Sparrow	26-171449	10/13/58 repeat 10/16	Nantucket, Mass.	Larsen	letter of 11/ 7/58	Greencastle, Pa.	22
White-throated Sparrow*	26-111640	11/27/57 repeat 3/8/58	Ardmore, Pa.	Marshall	10/30/58	Tiana Beach, N. Y. by Wilcox	236

Banded after specified O. R. period; not included in total bandings in 1957 report.
* Recaptured by another bander.

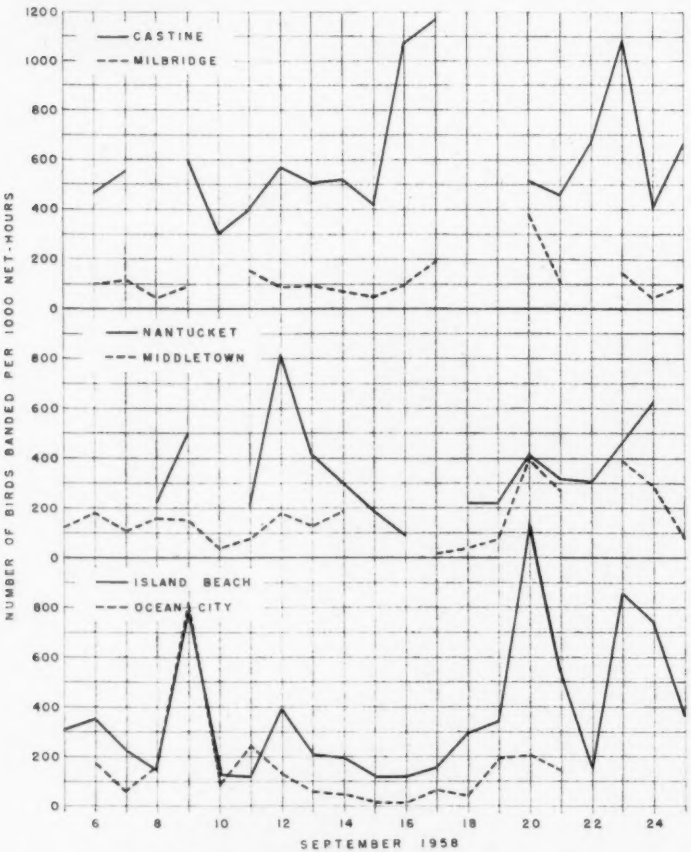

Fig. 3. Total birds banded per 1,000 net-hours during the period September 5 to 25 at the six most active stations.

the generalization in the paragraph above, and will deal mainly with the period September 5-26, 1958, when the six most active coastal stations (Milbridge and Castine, Maine; Nantucket, Mass.; Middletown, R. I.; Island Beach, N. J.; and Ocean City, Md.) were manned almost daily and provided comparable records. Relevant data from other periods and other stations will be mentioned more briefly.

Figure 3 shows the daily fluctuations in the netting rate at these six stations, expressed in terms of total birds banded per 1,000 net-hours. These figures, which eliminate the variation in the number of hours of

netting per day, provide the most reliable index of the fluctuations in migration intensity. They still are susceptible to bias produced by the variable factors mentioned on page 144. For this reason it is necessary to consider the total number of birds that was banded as well as the number banded per net-hour in order to properly evaluate the significance of an observed migration wave; this has been done throughout the following analysis.

It can be seen from Figure 3 that, with a few minor variations, there were five migration peaks shared by most or all of the stations, namely: September 6, 9, 12, 20, and 23. Special emphasis is placed on these peaks in the following analysis.

September 6.

A cold front, which moved eastward over the Northeastern States during daylight hours of the 5th, stalled on a line through southern Pennsylvania and Long Island during the night. To the north of this front the weather was cool (an average drop of 8° from the previous night)* and calm with variable cloudiness in northern New England and total overcast in a narrow belt along the front and in western New York. South of the front the weather was clear and warm with very light winds tending to SW along the coast.

At Island Beach there was a major wave of Catbirds (130 banded) together with good numbers of a few other species, notably Yellowthroat (46), Northern Waterthrush (29), Yellow-breasted Chat (7), Baltimore Oriole (9), and *Empidonax* flycatchers (18). The Ocean City movement was smaller, but included a similar range of species: Northern Waterthrush (11), Ovenbird (6), Yellow-breasted Chat (3), and the season's peak of Catbirds (4). North of the front, movement was relatively light: Castine had small numbers of Savannah Sparrows (6) and Swainson's Thrushes (4); Milbridge noted Swainson's Thrushes (3) and White-throated Sparrows (3). No movement was noted at Nantucket, while the species netted at Middletown were similar to those at the more southern stations: Catbird (10), Northern Waterthrush (2), and Baltimore Oriole (9, including the bird that was banded in Springfield, Mass.—see Table 3).

The paucity of migrants on the New England coast despite the sizable temperature drop may be due to the cloudy conditions behind the front, and perhaps also to the lack of offshore wind that might have concentrated the birds along the coast. The large migration in the very warm conditions south of the front may be associated with the light SW winds near the coast, as large numbers of Catbirds were recorded at Island Beach under similar weather conditions later in the month.

September 9.

During September 6, the Low that had been bringing cloud cover to western New York during the previous night moved across the Great

*Temperature changes mentioned in this section are based on averages of the 0100 hour E.S.T. readings, in degrees Fahrenheit, from Montreal and Quebec, Canada; Caribou and Portland, Me.; Burlington, Vt.; Boston, Mass.; Hartford, Conn.; Albany and Syracuse, N. Y.; and Avoca, Pa.; as published in the *Daily Weather Map* of the U. S. Weather Bureau.

Table 4. *Banding totals (birds per 1,000 net-hours) of the main species involved in the wave of Sept. 8-9, 1958.*

Species	Nantucket		Middletown		Island Beach		Ocean City	
September	8	9	8	9	8	9	8	9
Empidonax spp.	9	51	13	4	7	65	7	42
Swainson's Thrush	5	62	4	4	15	92	32	178
Veery	—	15	4	—	4	84	12	136
Red-eyed Vireo	—	10	—	—	9	55	5	30
Black-and-white Warbler	5	5	—	17	2	28	9	35
Ovenbird	—	10	—	—	2	28	—	46
Northern Waterthrush	23	10	4	—	9	29	19	28
Yellow-breasted Chat	23	5	4	—	2	12	7	16
American Redstart	32	108	4	21	14	85	25	62
Baltimore Oriole	—	51	4	—	3	53	2	132
Net-hours	216	195	234	234	987	1090	432	432

Lakes to the St. Lawrence, and a Tropical warm sector occupied the Northeastern States during the 7th. This was displaced as the cold front moved across the Eastern States during the afternoon and evening, clearing the coast by 0100 on the 8th. The remainder of this night was mainly cloudy with intermittent rain in northern and inland districts, but it was largely clear near the coast from New York City southward. Clearing was complete by the following night, and the weather situation was then the classic one for large migration on the Atlantic coast: a High centered in Ohio, the pressure gradient falling northeastward to a Low in the Gulf of St. Lawrence, and cool clear weather throughout the Eastern States. The temperature dropped an average of 8° on the night of September 7-8, and a further 8° the next night.

No significant immigration was noted on the night of the 7th, but on the 8th an increase was recorded at Nantucket, Middletown, and Ocean City, followed by a major wave on the 9th at all stations except Middletown. Table 4 gives banding totals of the species prominent in this wave. A wide variety of other species also was involved. This wave was noted also at Cos Cob, Conn., where unusually large numbers of birds, mostly northern warblers such as the Tennessee, Cape May, Black-throated Green, Magnolia, and Blackburnian, passed south and southwest throughout the day.

The lack of migration at Island Beach and the relatively small influx at Ocean City on the 8th presumably can be related to the wide area of cloud and rain that extended during the night south to central New Jersey. As similar weather prevailed over most of New England, it is hard to interpret the arrivals at Nantucket and Middletown on the 8th in terms of movement from the north. However, the weather southwest of these stations was clear with SW wind, and it is significant that there was a sudden influx of Yellow-breasted Chats both at Nantucket (5) and Middletown (1), the first recorded at these stations during the month.

September 11-12.

The next cold front passed eastward across the coast during the afternoon of the 10th, and the weather sequence on the 11th-12th was a close parallel to that on the 8th-9th, with the exception that there was less rain behind the front; the night of the 10th-11th was largely clear in coastal districts from southern Maine southward. The temperature

dropped 5° on the night of the 10th-11th, and a further 6° on the 11th-12th, which was the coolest night of the month in the Northeast.

On the 11th a small influx was noted at Milbridge (notably 8 White-throated Sparrows), Nantucket (a few warblers and flycatchers), and Middletown (a few warblers). More significant influxes were noted at Island Beach (66 Red-eyed Vireos, a major peak), at Cape May (58 American Redstarts and 27 thrushes), and at Ocean City (mainly thrushes and warblers). In contrast, on the 12th, Ocean City and Cape May had far fewer new birds and Island Beach had little more than a wave of Catbirds (100 banded); but the northern stations reported a large influx, especially at Nantucket, where 135 warblers were banded. The differential timing of this migration may perhaps be related to the concentrating effect of NW winds, for these were prevalent only at the southern stations during the first night, whereas winds in the north were mainly from the SW at this time; on the night of the 11th-12th the winds were light NW in New England and near calm in the Middle Atlantic States. Records from two inland stations were significant in this connection. Jamesburg, N. J., had a movement of Catbirds, Ovenbirds, American Redstarts, etc. on the 11th-12th, reaching a peak (17 birds banded in 96 net-hours) on the 13th; Claiborne, Md., had a peak (17 birds banded, including 9 American Redstarts) on the 12th. Both peaks took place in calm weather, when little migration was evident at the nearby coastal stations.

September 15-21.

There was no widespread migrational activity at the coastal stations in the few days following the wave of the 12th. The Catbird migration at Island Beach and Cape May continued in the calm weather of the 13th (58 and 10 banded, respectively), while in similar weather small movements of Swainson's Thrushes and White-throated Sparrows occurred at the Maine stations, increasing slightly as a weak front passed southward on the night of the 13th-14th. Ahead of this front Middletown experienced a small influx of warblers and Catbirds on the 14th, and Nantucket a wave of Catbirds on the 14th (21) and 15th (17), before the retreat of the front as a Tropical air flow developed from the SW.

This air flow formed the warm sector of a Low that moved across James Bay and Labrador during the 15th; its associated cold front crossed the New England States late that day and during the 16th. The front stalled over Long Island and Nantucket during the night of the 16th-17th, however, with the result that an area of cloud and rain extended north to southern Maine. Meanwhile a new Low developed from a wave on the front over Missouri. This Low, intensifying rapidly, moved through the Lower Great Lakes Area during the 18th, bringing rain to the Northeastern States; rain ended on the morning of the 19th as the Low moved out to sea. However, the weather in the ensuing high pressure ridge, although calm, remained overcast in the area south and west of Massachusetts, where the sky did not clear until the 22nd (Figs. 4 and 5). North of the overcast area the temperature dropped sharply on the night of the 19th-20th, but in the overcast area radiational cooling was prevented and temperatures actually rose slightly.

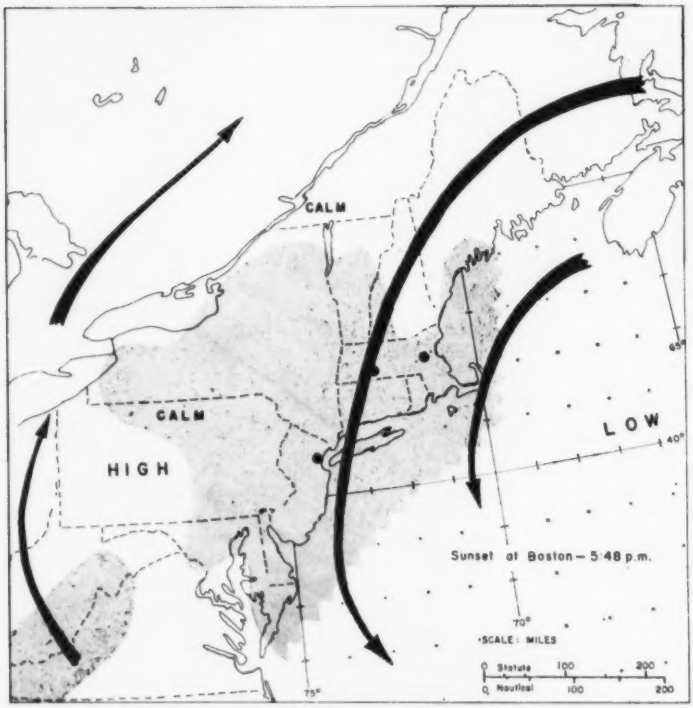

Fig. 4. Weather map for Sept. 19, 1958 at 1800 E.S.T., showing circulation and areas of overcast skies.

No appreciable migration occurred south of Maine on the 16th and 17th, but Maine banders noted movement of Swainson's Thrushes on both dates, and also of Myrtle Warblers and other species on the 17th. During early morning hours of the 17th, as the cloud cover lowered (Packard, 1958), hundreds of birds were killed near the Maine coast at the Portland airport ceilometer (Blackpoll and other warblers, 76%; flycatchers 13%). Many birds were killed at the ceilometer at Rome, N. Y., on the same night (Scheider, 1959), but only two Swainson's Thrushes and one Veery were killed at one of the Boston television towers. It appears that birds which had started to migrate under conditions of broken cloud had been stopped by the rain and cloud in southern Maine and central New York, and that few if any penetrated to the southern New England coast.

There was little migration at the northern stations on the 18th, but at Island Beach, close to the apex of the warm sector, there was a small increase in netted birds, including 34 Yellow-breasted Chats and 24 Baltimore Orioles. Orioles also showed a peak at Ocean City on the 17th (11) and Yellow-breasted Chats on the 18th (4). A sprinkling of southern and western birds appeared between the 13th and 18th at the

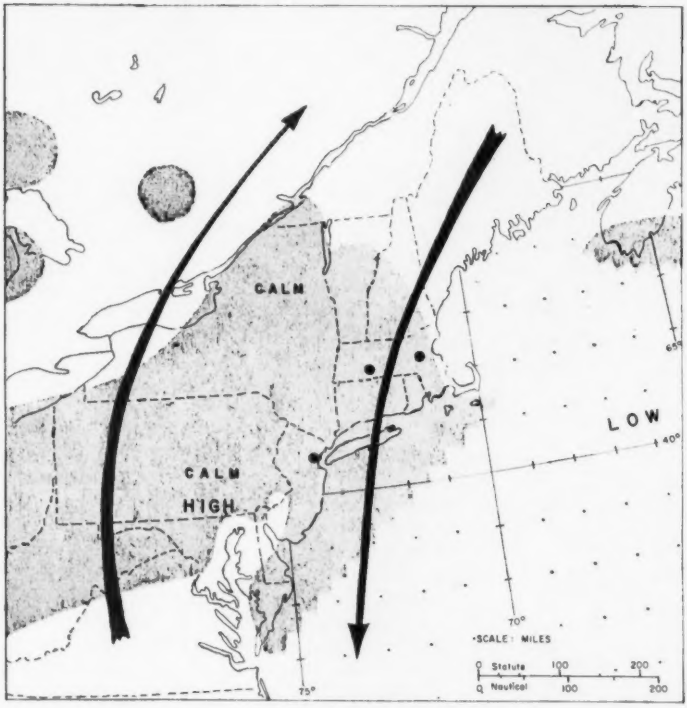

Fig. 5. Weather map for Sept. 20, 1958 at 0100 E.S.T., showing circulation and areas of overcast skies.

stations lying within the Tropical air flow: Blue Grosbeak (2) on the 13th at Nantucket; Summer Tanager (2) on the 14th at Ocean City; Lark Sparrow on the 15th at Nantucket: Clay-colored Sparrow on the 16th at Island Beach; Summer Tanager at Chincoteague, Va., and Island Beach on the 17th; and Blue Grosbeak at Island Beach on the 18th. In addition to these birds at the banding stations, other records during the same period were: three Western Kingbirds, ten Blue-gray Gnatcatchers, two Yellow-breasted Chats, a Hooded Warbler, and two Western Tanagers on Cape Cod, Mass., a Lark Bunting at Plum Island, Mass., and a Say's Phoebe at Gilgo, Long Island, N. Y. (Stackpole and Emery, 1959; Nichols, 1959).

A major wave started on the 19th at most stations, especially at Ocean City and Cape May. It reached a peak at all stations on the 20th and continued to a lesser extent on the 21st. Table 5 gives the banding totals (per 1,000 net-hours) of the most numerous species in this wave at the five major stations, and also the number of dead birds of these species recovered at two Boston television towers. On the night of September 19-20, heavy mortality also was reported from ceilometers

Table 5. *Television tower mortality and banding totals (birds per 1,000 net-hours) of the main species involved in the wave of Sept. 19-21, 1958.*

Species	Boston TV towers			Nantucket			Middletown			Island Beach			Cape May			Ocean City		
September	19	20	21	19	20	21	19	20	21	19	20	21	19	20	21	19	20	21
Empidonax spp.	—	—	1	14	7	11	—	9	—	6	37	35	45	4	—	5	3	—
Brown Creeper	—	—	—	—	46	9	—	—	—	2	2	—	—	—	—	—	—	—
Catbird	—	—	—	6	55	51	8	100	78	15	80	20	91	70	107	4	3	8
Swainson's Thrush	—	—	—	6	7	17	8	5	4	27	196	75	45	118	143	20	20	8
Gray-cheeked Thrush	—	—	—	3	2	7	—	9	17	4	42	20	17	39	71	2	—	3
Veery	—	1	—	—	—	6	—	—	—	4	30	7	45	118	107	9	8	—
Red-eyed Vireo	—	20	6	8	9	4	—	9	—	24	104	33	12	96	—	2	29	8
Black-and-white Warbler	—	44	3	11	19	11	8	45	13	5	39	29	17	18	—	4	5	5
Magnolia Warbler	—	19	2	11	7	4	—	5	4	14	40	9	8	4	71	12	2	—
Blackpoll Warbler	—	18	4	3	5	4	—	14	—	50	14	22	4	—	—	7	3	3
Bay-breasted Warbler	—	15	2	11	5	2	—	—	—	1	9	2	—	4	—	—	3	—
Ovenbird	—	30	8	—	7	11	—	5	4	1	27	20	25	31	107	2	2	—
Northern Waterthrush	—	—	1	14	12	21	—	9	9	1	25	18	12	75	107	2	12	3
Yellowthroat	—	1	—	6	19	13	—	14	22	8	27	15	128	53	71	4	15	3
Yellow-breasted Chat	—	—	2	9	2	—	—	—	4	12	8	11	29	—	36	20	5	—
American Redstart	—	30	5	11	33	37	8	77	4	30	174	84	364	232	107	30	32	30
Scarlet Tanager	—	—	—	—	5	—	—	—	—	5	5	2	4	—	—	9	8	3
Rose-breasted Grosbeak	—	1	—	—	5	—	—	—	—	4	19	—	4	—	—	4	3	3
Net-hours	—	—	—	354	583	534	120	220	232	948	855	455	242	228	28	564	591	368

at West Springfield, Mass., and Newark, N. J., involving a range of species very similar to that at Boston. On the same night there was a large migration of thrushes over Cambridge, Mass., and Middletown, R. I.; and on the next day large numbers of birds were recorded all along the New England coast (Stackpole and Emery, 1959; Baird, 1959).

A most interesting feature of this wave is the weather pattern in which it originated. In the other situations in which heavy flights originated, both in September 1957 and September 1958, clear skies and falling temperatures prevailed over a wide area immediately to the north of those netting stations that experienced a heavy influx of transients. On the night of September 19-20, 1958, on the other hand, a cloud blanket covered southern New England and adjacent areas. Figures 4 and 5 show the extent of cloud cover in the Northeast at 1800 E.S.T. on September 19 and 0100 on September 20. Although the great majority of the birds that struck the Boston TV towers that night, and many of the birds that arrived at the New England coastal netting stations, probably originated north of the overcast area, it is debatable whether all the birds that were recorded at the Newark ceilometer and Island Beach could have come from areas where skies had begun to clear. Unfortunately, it has not been possible to ascertain the time of night at which the Newark ceilometer kill started, so that the distance the birds might have flown cannot be calculated; but the weather records show that there were no breaks in the overcast within 180 miles of Newark at sunset on the 19th. Thus it is quite possible that much of this flight originated under largely or totally overcast conditions, as was almost certainly true for part of the flight that reached southern New England on the previous night.*

In this connection it should be noted that: (1) There had been no heavy migration through southern New England since September 12 (8 days); (2) A cold front had moved slowly southward through New England, causing a sharp temperature drop in the north on September 17 and 18; (3) Overcast skies and general rain had blanketed New York and most of New England on the nights of September 16-17 and 17-18, but precipitation had ceased over most of the area by sunset on the 19th.

Weather conditions like those that existed on the night of September 19-20 over southern New England normally would have seemed very unfavorable for the initiation of a substantial migration wave. However, the combination of a long period of "hold-up," cold frontal passage three days before and an associated temperature drop (followed by a continuation of low temperatures), cessation of precipitation, and possibly indication of clearing weather, apparently produced an exceptionally strong motivation to migrate. It seems possible also that the stormy weather in the intervening period had provided an additional stimulus so that the flight was released at the very first sign of improvement (*cf.* Ball, 1947; Nisbet, 1957). The separate effects of these individual factors cannot be evaluated at the present time.

*In particular, thrushes were heard over Cambridge, Mass. (84 calls in 11 minutes) two hours after sunset on the 18th, although 20 stations within 200 miles northeast and northwest all reported solid overcast at sunset.

Ten of the 23 Ovenbirds preserved from those killed at the Boston TV towers on the night of September 19-20 were identified by T. D. Burleigh as *S. a. furvior*. This confirms the northeastern origin of some of the birds reaching Boston in that wave.

In contrast to the wave of the 12th, there was little offshore wind on the night of the 19th-20th and none at all on the 20th-21st; thus the wind could not have been the primary cause of a concentration on the coast. The large numbers of birds at the coastal stations may have been in part a result of disorientation and confused flight caused by overcast weather. This explanation has been suggested by Baird (1959) for the birds seen off the Rhode Island coast on the 20th; overcast weather also is associated with the collision casualties, such as those that occurred at the television towers and at the ceilometers that night.

It is interesting to note from Table 5 that a few species (*e.g.*, Blackpoll Warbler, Yellow-breasted Chat, and Scarlet Tanager) arrived in greater numbers on the 19th, the first day of the wave. This movement of chats may be connected with the waves in SW winds on the previous two days, and it is interesting that other southern and western birds also appeared at this time; *viz.*, 4 Dickcissels at Nantucket on the 19th and 20th; Blue Grosbeak at Ocean City on the 19th; White-eyed Vireos at Middletown and Kingston, R. I., on the 20th; Hooded Warblers at Nantucket on the 19th, at Cape May and Island Beach (2) on the 19th-20th, and at Ocean City on the 20th-21st; Lark Bunting at Nantucket on the 20th; 5 Western Kingbirds in New England, including one at Middletown on the 21st; and a Yellow-headed Blackbird and a Clay-colored Sparrow at Nantucket on the 21st.

September 23.

The wave of the 21st was stopped by a complex low pressure system that passed through on the night of the 21st-22nd, bringing rain to the entire Atlantic seaboard. This was succeeded in the latter part of the night by a SW airflow followed by a second cold front, which passed rapidly out to sea on the 22nd. By 0100 on the 23rd, the High was centered over Pennsylvania and produced a light NW airflow over the Northeast. On the following night, calm clear weather prevailed along the entire coast; the wind returned to SSW late on the 24th as the High moved out to sea. The average temperature dropped 6½° on the night of the 22nd-23rd and rose again 2½° the following night.

Very little migration was noted at the coastal stations after the SW wind on the night of the 22nd, but a Worm-eating Warbler was trapped at Nantucket and some 10 birds, including a Yellow-breasted Chat, a Connecticut Warbler, and a Scarlet Tanager, were killed at the Boston television towers. The 23rd was a peak day at all the stations manned: Milbridge had an influx of Robins (9); Nantucket banded 95 warblers (including 13 Blackpolls, 31 American Redstarts, and a Yellow-breasted Chat), 16 Catbirds, 13 Brown Creepers, 11 Swainson's Thrushes, and 32 White-throated Sparrows; and Middletown netted 5 Swainson's and 4 Gray-cheeked Thrushes, 4 Ovenbirds, and 3 Blackpoll Warblers. Island Beach, like Nantucket, had a sudden influx of Brown Creepers (17) and White-throated Sparrows (53), in addition to a peak of 24

Rufous-sided Towhees and many other common species. An all-day diurnal movement of similar species was noted at Cos Cob, Conn.

This wave provides an excellent example of the importance of falling temperature in initiating a migratory flight, because the peak coincided with the drop in temperature, and the decline in migration the next day coincided with a warming trend. As on September 6 and September 13, the Catbird was the main species to move in the calm center of the High.

Other waves.

Fewer stations were manned outside the period September 5-26, so it is not possible to analyze the remainder of the migration in similar detail; but all the large waves that were recorded followed closely after the passage of cold fronts. The following few examples in August and October provide particularly interesting data.

The cold front of August 31—September 1 was followed in New England by an area of cloud that persisted for some 36 hours; a small wave of warblers arrived at Middletown on the 2nd and 3rd, and a more pronounced wave reached Nantucket, where 15 American Redstarts were banded on the 2nd and 27 Northern Waterthrushes on the 3rd. Like the cold front of September 18 (but unlike others during the month, which were not preceded by a strong flow of Tropical air from the SW), this front was preceded and followed by the arrival of a number of southern and western birds, notably Yellow-breasted Chats, Blue-gray Gnatcatchers, and Lark Sparrows on the New England coast (Stackpole and Emery, 1959); there was also a Kentucky Warbler at Middletown on September 1, and single Worm-eating and Hooded Warblers were banded at Nantucket on September 2.

The cold front of September 26-27 was followed by a cloud belt associated with hurricane "Helene"; skies cleared when the flow of Polar air was re-established on the night of the 28th-29th. Little migration was evident until the 29th, when Nantucket had its largest banding total of the month (250 birds).

The cold front of October 5 was the first since August to be followed closely by clear skies and a strong flow of Polar air. At Nantucket, these conditions resulted immediately in a large wave on the 6th (179 birds per 100 net hours), composed principally of White-throated Sparrows and Slate-colored Juncos. Large numbers of these two species and of White-crowned Sparrows also were present on the next two days in the center of the high pressure ridge.

The cold front of October 10-11 was noteworthy for its strong flow of Polar air from the NW; this persisted until late on the 13th and resulted in an aggregate temperature drop of 20°-30° in the Northeast. This produced the largest wave of the season, building up to a peak on the 13th, when 597 birds were trapped in 197 net-hours at Nantucket, and 236 in only 20 net-hours at Block Island, R. I., where tens of thousands of migrants were present (Baird and Nisbet, in prep.). The most numerous species were Yellow-shafted Flicker, Myrtle Warbler, Savannah Sparrow, Slate-colored Junco, Chipping Sparrow, and White-throated Sparrow; unusually large numbers of White-crowned Sparrows were noted on outer Cape Cod and on Nantucket.

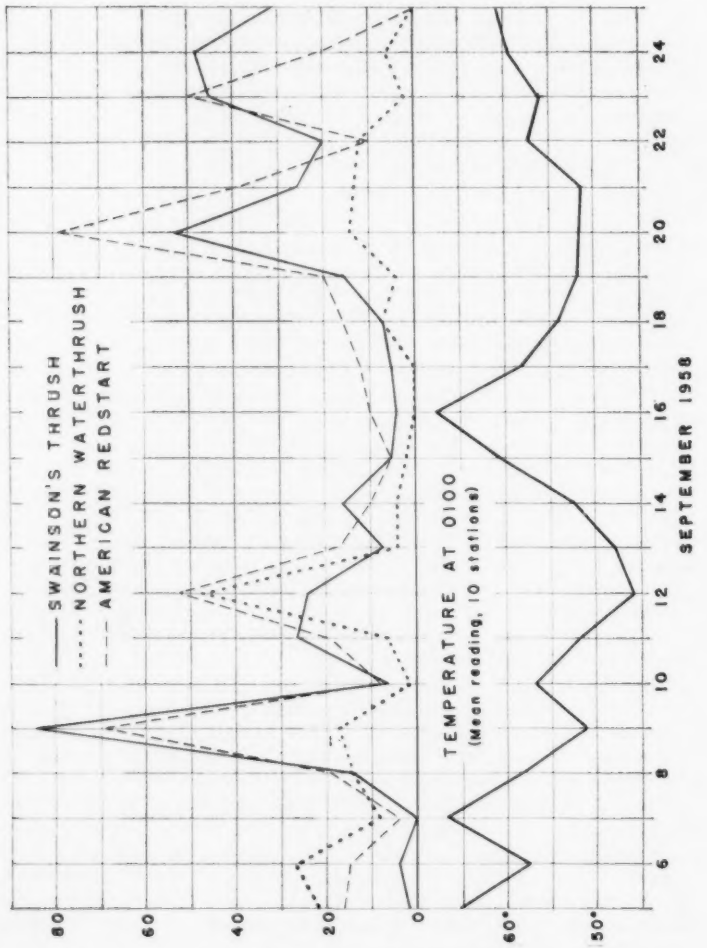

Fig. 6. Graph showing migration peaks coinciding with marked temperature drops.

The cold front of the 17th-18th produced waves as far apart as Brier Island, N. S., and Long Island, N. Y., but no very striking influx was noted at Nantucket. This wave was notable at Brier Island for late records of Canada and Black-and-white Warblers, among others, and for records of 2 Western Kingbirds, 2 Brown Thrashers, a Yellow-breasted Chat, and a Dickcissel. A Sage Thrasher was netted at Tiana Beach, Long Island, on the 18th, and on the same day Western Kingbird, Blue Grosbeak, Lark and Clay-colored Sparrows were seen at Riis Park. Although the migration on the Long Island coast had dropped

off markedly on the 19th, that day marked the peak inland at Jamesburg, N. J., where 32 birds were trapped as compared with 14 on the 18th. The same anomaly was noted in several earlier waves at this station when inland peaks occurred on September 2-3, 13, 24 and 30, and on October 9 and 14-15, corresponding to coastal waves on September 2, 11-12, 23 and 29, and October 6 and 12-13.

The last major wave in the Operation Recovery period occurred at the end of October, following the clearance of a persistent coastal Low that brought continuous rain to southern New England, October 22-29. At Tiana Beach, L. I., the wave was noted from October 29 through October 31, and involved mainly Slate-colored Juncos, other sparrows, and Myrtle Warblers (550 birds per 100 net-hours for the three-day period). At Nantucket, however, the movement began on the 28th, while the Low was still centered in the Hudson Valley and was producing SW winds along the coast north of Virginia and rain over the entire area northward. It is therefore difficult to account for the arrival of the birds at Nantucket unless it is supposed that they came from the southwest. This hypothesis would explain the occurrence of many late stragglers there, including Red-eyed Vireo, Black-and-white Warbler, American Redstart, Ovenbird, and Baltimore Oriole.

Discussion and Conclusions.

Although the autumn's records provide abundant confirmation of the correlation between waves of migrants on the coast and the NW flow of Polar air behind cold fronts, the detailed analysis of the records for September emphasizes the diversity of factors to which the birds actually react. The influx of Polar air usually leads to a sharp fall in temperature that is closely correlated with clearance of cloud behind the cold front. In typical circumstances, both factors stimulate migrants simultaneously. The effect of temperature is shown in Figure 6, which demonstrates the close correlation between the average temperature in the region and the observed migration waves of three species of common nocturnal transients; the number of birds per 1,000 net-hours is the mean from four stations (Nantucket, Middletown, Island Beach, and Ocean City), each station weighted equally. Specific examples of temperature effects also are provided by the chronology of the wave of September 23-24 and the large number of birds on the island stations on October 13.

The wave of September 19-21 shows that in unusual circumstances birds may start to migrate in numbers under an overcast sky, apparently influenced by a temperature drop a few days earlier and the cessation of stormy weather. As was particularly emphasized by this latter wave, the amount of stimulation necessary to initiate migration thus will depend upon the specific and individual stage of the migration cycle, and will be less for a bird that is late or has been held up for a long period.

As usual, many of the large waves (with exceptions to be discussed below) took place in NW winds. We believe that this correlation is exaggerated by concentration against the coast by wind-drift of the kind discussed elsewhere by Baird and Nisbet (in prep.). Three separate features of the 1958 records suggest that at times such drift can be important:

1. During the wave of September 5-6, migrants were seen in large numbers only at stations where the wind was blowing from the NW.
2. Migration peaks at the inland station at Jamesburg, N. J., consistently occurred in calm weather, one day later than the corresponding peaks in NW winds at the nearby coastal station at Island Beach.
3. During September, cold frontal activity was weak, and there were few periods of prolonged NW winds of any strength on the Atlantic coast. Correspondingly, several stations in New England agreed in reporting a poor migration, without well-marked waves. In contrast, after the cold front of October 10-11, NW winds persisted in unusual strength for nearly 72 hours, and produced the best migration wave of the season on the 13th.

On the other hand, there were several times when northern species arrived at Nantucket in N or NE winds, which suggests that they crossed the Gulf of Maine directly from the north or northeast (Dennis, 1957-58). The significance of these records is discussed more fully elsewhere (Baird and Nisbet, in prep.). They do suggest that the occurrence of migrants on the coast is not completely dependent on offshore winds.

As was noted in the analysis of the 1957 Operation Recovery data, the sequence of migration events at the coastal stations usually can be correlated with the eastward movement of high pressure cells: the largest immigrations take place in the eastern and northeastern parts of the Highs. Although this conclusion was confirmed in the 1958 season, it also was found that arrivals of some species often continued in the central and western parts of the Highs. This happened under the specialized conditions outlined below.

Some common coastal migrants (notably the Catbird) often are poorly represented in the big waves that take place in NW winds, and instead occur in largest numbers in calm weather or even in SW wind. As their migration on the days of peaks of other species is liable to be overemphasized by the effect of drift against the coast in NW winds, it is evident that these species migrate at least as often in the central or western part as in the eastern part of a high pressure cell.

The species whose occurrence on the coast is most closely associated with SW wind is the Yellow-breasted Chat; in fact, *all* the waves of chats at the more southern stations, both in 1957 and 1958, took place within tropical air flowing from the southwest. Significantly, many of these waves coincided with arrivals of chats at Middletown and Nantucket, close to the northeastern edge of the species' range. In view of the occurrence of other, rarer, southern and western species at the same stations at the same time (*e.g.*, during September 13-19), it is natural to suspect that these chats arrived in New England from the southwest, flying in the SW winds within a Tropical warm sector. The wave of chats on September 18, at Island Beach, at the apex of a warm sector, is a very striking parallel to the waves of northeastward flying migrants that are produced in spring by the same conditions (Gunn and Crocker, 1951; Bagg, 1957, 1958).

The occurrence of Yellow-breasted Chats, and other southern and western birds, on the New England coast in NW winds, in conjunction with waves of northern migrants, now takes on new significance. The birds that are found on the mornings after overnight cold front passage

(as on September 1 and 19 and October 18, 1958) may well be birds whose northeast flight has been "arrested" by the front, as often happens in spring (Bagg *et al.*, 1950). Others may have arrived from the southwest one or more days earlier, and then been stimulated by the cold frontal passage to return southward; their migration would thus be "redetermined passage" of the kind discussed by Nisbet (1957). Classic examples of redetermined passage date from the autumn of 1954, when many southern vagrants were carried north by hurricanes, and then filtered southward through New England following subsequent cold fronts (Baird, 1955). Migration sequences such as that of September 13-19, 1958, certainly give much support to the hypothesis that chats and other southern and western species usually reach New England from the southwest, flying within Tropical warm sectors.

Waves of chats usually are associated with relatively small influxes of more common species at the coastal stations, and it is hard to believe that their origins could be dissimilar. A suggestive case is the chat movement of September 6, 1958, when Catbirds, Baltimore Orioles, Northern Waterthrushes and Ovenbirds also reached peak numbers at Island Beach in SW winds, and were also the dominant species at Middletown, although the more northern stations recorded a quite different range of species. Catbirds and Baltimore Orioles also were prominent in the movements in the SW winds in mid-September. Daily banding totals of Catbirds at Island Beach from the 15th to the 18th were 28, 25, 56, and 50. The number dropped to 14 on the 19th as other species began to arrive in numbers. Pending further investigation, it seems reasonable to suggest that the northeast movements in Tropical air are shared by a variety of different species, those of southern and western range (*e.g.*, Yellow-breasted Chats and Western Kingbirds) providing useful clues as to the origin of the others.

This hypothesis would account for many puzzling features of migration on the northern half of the Atlantic coast: the northeastward movement of some banded birds (Lincoln, 1939; Baird *et al.*, 1958); the simultaneous arrival of rarities of southern and western origin (Baird *et al.*, 1958); and the prolongation of the migration of many species into October and November, long after their passage is over at comparable latitudes inland (Borror, 1950; Griscom and Snyder, 1955). It is difficult, however, to suggest any plausible reason for such reverse movements. Disorientation by cloud, the cause of similar movements in Europe (Williamson, 1955), is ruled out, as Tropical air usually is clear. The wind usually is not strong enough to force birds northeastward if they are attempting to fly toward the south or southwest: the birds must be orienting northeastward.

There is evidence from the Boston television tower and Empire State Building records in 1957-58 (see, for example, the movement of September 22 discussed above) that northeastward movement of chats and other species sometimes takes place if the wind is SW *behind* a cold front (*i.e.* not in Tropical air); this suggests that the direction of the wind may be an important factor in orienting these movements. Further investigation of these puzzling reverse movements will be one of the major tasks of "Operation Recovery" in future years.

PARASITES

At the Middletown, R. I., station during the 1958 period, 72 specimens of two species of flies (Hippoboscidae—*Ornithomyia fringillina* and *Ornithoica vicina)* and one tick *(Haemaphysalis leporis-palustris)* were collected from 18 species of birds. The number and hosts of flies seen but not captured also were noted. All information and specimens were sent to Dr. Joseph C. Bequaert at the University of Houston, Houston, Texas.

BIRD WEIGHTS

Body weights, fat class data, and wing measurements from several thousand birds banded in 1958 and prior years are being analyzed for separate publication.

PLANS FOR 1959

It is expected that the 1958 netting stations will be in operation again in 1959, and that a few additional staions will be established. Banders who wish to operate nets at old stations or to establish new netting locations are urged to notify the senior author of their intentions, in order that the best possible coverage may be arranged. In addition to the coastal network, series of netting stations are being planned along some of the Great Lakes, the Appalachian Mountains, the Gulf of Mexico, and possibly the east face of the Rocky Mountains. Participants are also welcome in inland localities away from concentration points, provided their stations are operated on a daily basis during the peak period.

Although Operation Recovery will extend through the months of August, September, and October, it is hoped that all of the principal stations can be in continuous operation during the period from September 5 to 27 inclusive. In previous years the suggested dates were staggered in order to coincide with the southward progress of the peak of the insectivorous migrants. It now is apparent, however, that the advantages of having all stations in operation at the same time greatly outweigh the advantages of attempting to follow the peak of migration. The greatest usefulness of the data has been in showing the effects of weather conditions over a large area.

There is still an urgent need for systematic observations of visible migration, for nocturnal call counts, and for lunar observations, both at the netting stations and at other localities during the Operation Recovery period. Other ways in which non-banders can contribute to this project can be outlined by any of the station operators.

SUMMARY

Operation Recovery, 1958, resulted in the banding of 20,221 birds during August, September and October at the 18 most active netting stations on and near the Atlantic coast from Nova Scotia to Virginia. Banding totals for the more common species in the months of August and September were compared with totals for the same period in the preceding year. The Catbird was the only common species that registered a general decline in 1958. A summary of banding activity

at each station is given. At Middletown, R. I., 72 specimens of 2 species of Hippoboscidae and one tick were collected from netted birds.

One additional direct recovery and 6 subsequent recoveries of 1957 birds are listed and mapped together with several from October 1957 bandings (after the O. R. period). Ten direct recoveries of 1958 birds, including two from South America, also are listed and mapped.

The relation between the weather and the arrivals of migrants at the coastal stations is analyzed with special reference to the period September 4-24, when a number of stations were manned simultaneously. All the large waves of migrants followed closely after the passage of cold fronts through the coastal areas. Largest numbers usually coincided with a sharp temperature drop in the Northeast and a strong flow of Polar air from the NW. Several waves in September were delayed for one or two days by areas of cloud and rain behind the cold fronts. In one unusual case when cloudy, wet weather persisted for several days over southern New England, some birds appear to have started to migrate under totally overcast skies; but complete analysis of this situation is complicated by the simultaneous arrival of other birds from clear areas to the northeast.

Migration usually declined at the coastal stations as the high pressure cells moved eastward and the NW winds dropped; but movements of Catbirds usually continued or even strengthened under these conditions. Waves of Yellow-breasted Chats frequently occurred at the coastal stations in SW winds within Tropical warm sectors, and it is suggested that the birds were arriving from the southwest. Such movements appear to coincide with arrival of many other southern and western birds in the Northeast, and there is circumstantial evidence that these movements are shared also by a number of more common species.

REFERENCES CITED

BAGG, AARON M. 1957. The changing seasons—a summary of the spring migration. *Audubon Field Notes*, **11**(4): 312-325.

———— 1958. The changing seasons—a summary of the spring migration. *Audubon Field Notes*, **12**(4): 320-333.

————, W. W. H. Gunn, D. S. Miller, J. T. Nichols, W. Smith, and F. P. Wolfarth. 1950. Barometric pressure patterns and spring bird migration. *Wilson Bull.*, **62**(1): 5-19.

BAIRD, JAMES. 1955. The effect of a hurricane on coastal migrants. *Bull. Mass. Audubon Soc.*, **39**(2): 85-87.

———— 1959. Land birds at sea. *Narragansett Nat.*, **2**(1): 29.

———— and I. C. T. NISBET. 1959. Observations of diurnal migration in the Narragansett Bay area of Rhode Island in fall, 1958. *Bird-Banding*, this issue.

————. In preparation. Reverse fall migration on the Atlantic coast and its relation to offshore drift.

————, C. S. Robbins, A. M. Bagg, and J. V. Dennis. 1958. "Operation Recovery"—the Atlantic coastal netting project. *Bird-Banding*, **29**(3): 137-168.

BALL, STANLEY C. 1947. Migration of Red-breasted Nuthatches in Gaspé. *Ecol. Monographs*, **17**(4): 502-533.

BORROR, DONALD V. 1950. A check list of the birds of Ohio, with the migration dates for the birds of central Ohio. *Ohio Jour. Sci.* **50**(1): 1-32.

DENNIS, JOHN V. 1957-58. Are warblers decreasing? *Audubon Mag.*, **59**(5): 210-213, 227, 235; **59**(6): 278-281; **60**(1): 32-34.

DOW, DOUGLAS D. 1959. Point Pelee fall banding 1958. *Ontario Bird Banding Assn. Newsletter* **4**(2): 2-4.

GRISCOM, LUDLOW and D. E. SNYDER. 1955. The birds of Massachusetts—an annotated and revised check list. Salem, Peabody Mus. 295 pp.

LINCOLN, FREDERICK C. 1939. The migration of American birds. Doubleday, Doran & Co., New York. 189pp.

GUNN, WILLIAM W. H. and A. M. CROCKER. 1951. Analysis of unusual bird migration in North America during the storm of April 4-7, 1947. *Auk*, **68**(2): 139-163.

MUELLER, HELMUT C. 1959. Mist-netting—Cedar Grove Ornithological Station in Wisconsin, fall 1958. *Inland Bird Banding News*, **31**(1): 1-2.

NICHOLS, CHARLES K. 1959. Hudson—St. Lawrence Region (Fall Migration, 1958). *Audubon Field Notes*, **13**(1): 13-17.

NISBET, IAN C. T. 1957. Passerine migration in south Scandinavia in the autumn of 1954. *Ibis*, **99**(2): 228-268.

PACKARD, CHRISTOPHER. 1958. Bird mortality during a migration. *Maine Field Nat.*, **14**(4): 83-85.

SCHEIDER, FRITZ. 1959. Region 5—Oneida Lake basin. *Kingbird*, **8**(4): 121-125.

STACKPOLE, RICHARD, and R. P. EMERY (Eds.). 1958. *Records of New England Birds*, **14**(9): 1-25.

WILLIAMSON, KENNETH. 1955. Migrational drift. Acta. XI Congr. Int. Orn. Basel: 179-186.

APPENDIX

Scientific Names of Bird Species Mentioned in the Text

Pigeon Hawk, *Falco columbarius*
Semipalmated Sandpiper, *Ereunetes pusillus*
Barred Owl, *Strix varia*
Saw-whet Owl, *Aegolius acadicus*
Yellow-shafted Flicker, *Colaptes auratus*
Red-headed Woodpecker, *Melanerpes erythrocephalus*
Western Kingbird, *Tyrannus verticalis*
Say's Phoebe, *Sayornis saya*
Black-capped Chickadee, *Parus atricapillus*
Red-breasted Nuthatch, *Sitta canadensis*
Brown Creeper, *Certhia familiaris*
Catbird, *Dumetella carolinensis*
Brown Thrasher, *Toxostoma rufum*
Sage Thrasher, *Oreoscoptes montanus*
Robin, *Turdus migratorius*
Wood Thrush, *Hylocichla mustelina*
Swainson's Thrush, *H. ustulata*
Gray-cheeked Thrush, *H. minima*
Veery, *H. fuscescens*
Blue-gray Gnatcatcher, *Polioptila caerulea*
Cedar Waxwing, *Bombycilla cedrorum*
White-eyed Vireo, *Vireo griseus*
Red-eyed Vireo, *V. olivaceus*
Black-and-white Warbler, *Mniotilta varia*
Worm-eating Warbler, *Helmitheros vermivorus*
Blue-winged Warbler, *Vermivora pinus*
Tennessee Warbler, *V. peregrina*
Orange-crowned Warbler, *V. celata*
Yellow Warbler, *Dendroica petechia*
Magnolia Warbler, *D. magnolia*
Cape May Warbler, *D. tigrina*
Black-throated Green Warbler, *D. virens*
Blackburnian Warbler, *D. fusca*
Myrtle Warbler, *D. coronata*
Bay-breasted Warbler, *D. castanea*
Blackpoll Warbler, *D. striata*
Pine Warbler, *D. pinus*
Ovenbird, *Seiurus aurocapillus*
Northern Waterthrush, *S. noveboracensis*
Kentucky Warbler, *Oporornis formosus*

Connecticut Warbler, *O. agilis*
Mourning Warbler, *O. philadelphia*
Yellowthroat, *Geothlypis trichas*
Yellow-breasted Chat, *Icteria virens*
Hooded Warbler, *Wilsonia citrina*
Canada Warbler, *W. canadensis*
American Redstart, *Setophaga ruticilla*
Yellow-headed Blackbird, *Xanthocephalus xanthocephalus*
Baltimore Oriole, *Icterus galbula*
Brown-headed Cowbird, *Molothrus ater*
Western Tanager, *Piranga ludoviciana*
Scarlet Tanager, *P. olivacea*
Summer Tanager, *P. rubra*
Rose-breasted Grosbeak, *Pheucticus ludovicianus*
Blue Grosbeak, *Guiraca caerulea*
Dickcissel, *Spiza americana*
Purple Finch, *Carpodacus purpureus*
Rufous-sided Towhee, *Pipilo erythrophthalmus*
Lark Bunting, *Calamospiza melanocorys*
Savannah Sparrow, *Passerculus sandwichensis*
Lark Sparrow, *Chondestes grammacus*
Slate-colored Junco, *Junco hyemalis*
Chipping Sparrow, *Spizella passerina*
Clay-colored Sparrow, *S. pallida*
White-crowned Sparrow, *Zonotrichia leucophrys*
White-throated Sparrow, *Z. albicollis*
Song Sparrow, *Melospiza melodia*

Norman Bird Sanctuary, Third Beach Road, Middletown, R. I.; Farm Street, Dover, Mass.; 19 Wendell Street, Cambridge, Mass.; Bureau of Sport Fisheries and Wildlife, U. S. Department of the Interior, Patuxent Research Refuge, Laurel, Md.

OBSERVATIONS OF DIURNAL MIGRATION IN THE NARRAGANSETT BAY AREA OF RHODE ISLAND, IN FALL 1958

By JAMES BAIRD and IAN C. T. NISBET

INTRODUCTION

In spite of its great development in Europe, the study of the diurnal migration of passerines has been badly neglected in North America. Indeed, we have found only the most casual references to it in the literature of New England birds. Nevertheless, while the east coast of North America has nothing to rival the vast finch migrations of Europe, visible migration is a conspicuous phenomenon in New England and can at times be quite spectacular.

In this paper we describe intermittent observations of diurnal migration made during the fall of 1958 in the Narragansett Bay area of Rhode Island. The geography of this area (Fig. 1) raises problems of special interest in regard to the behavior of migrating birds faced with a water crossing. Birds flying west along the coast must make several water crossings of a mile or more in order to pass through the area, while even those flying further inland, away from the coast, encounter wide stretches of open water in the upper bay. Observations at Brenton Point in 1956 and 1957 (Baird *et al.*, 1958) had shown that many coasting birds, particularly Eastern Kingbirds *(Tyrannus tyrannus)*, Bobolinks *(Dolichonyx oryzivorus)* and Redwinged Blackbirds

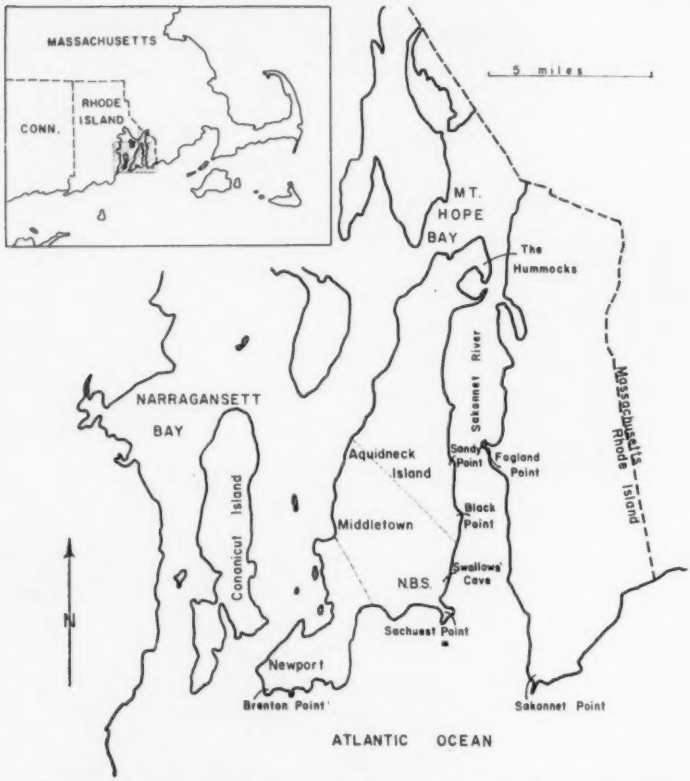

Fig. 1. The Narragansett Bay area of Rhode Island, showing places referred to in the text. The area consists largely of agricultural and suburban land, with a few extensive areas of woodland, and lies mainly below 200 feet above sea level.

(Agelaius phoeniceus), departed northwest rather than continuing due west towards the southern tip of Conanicut Island. The observations made in 1958 were designed to show whether this curious behavior is shared by other species, and whether it takes place also at Sakonnet Point. In addition, we were interested to find out to what degree the coast formed a line of concentration for migrating birds and to what extent migration took place farther inland.

Our observations are also relevant to the divergent results obtained by Ball (1952) in the Gaspé Peninsula, Quebec, and by Stone (1937) at Cape May, New Jersey. While Ball stated that diurnal migrants were deflected for several miles by even small stretches of water, Stone thought that birds coasting southward normally cross the 13 mile mouth of Delaware Bay unless the wind is in the northwest, when they turn into the wind and form spectacular concentrations. Further comparative observations of the same species in different geographical situations are needed before such behavior can be understood.

TABLE 1. *Summary of observations, 1958.*

Date	Place	Time (E.S.T.)	Wind
Aug. 19	Brenton Point	0649-0725	Strong NNW
Aug. 20	Swallows' Cave	0725-0750	Calm
Aug. 22	Brenton Point	0755-0900	Light S
Aug. 27	Brenton Point	0845-0920	Light NE
Sept. 2	Sakonnet Point	0445-0745	Moderate to fresh NNW
	Swallows' Cave	0500-0810	
Sept. 3	Sakonnet Point	0520-0735	Light NNE
	Swallows' Cave	0500-0735	
Sept. 8	Swallows' Cave	0610-0920	Light NW
Sept. 28	Brenton Point	1200-1235	Strong NE
Sept. 29	Swallows' Cave	0525-0705	Light to mod. N
Oct. 2	Swallows' Cave	0615-0640	Mod. to fresh NW
Oct. 4	Swallows' Cave	0540-0615	Moderate NW
Nov. 2	Sakonnet Point	0555-0830	Mod. to fresh NNW
Nov. 7	Swallows' Cave	0830-0900	Light NW
Nov. 8	The Hummocks	0605-0755	Light W
	Sandy Point	0815-0845	
	Swallows' Cave	0630-0745	
		0900-0915	
Nov. 12	The Hummocks	0640-0830	Moderate SW

OBSERVATIONS

The observations we made in 1958 are summarized in Table 1, place names used there and elsewhere in the text being marked in Figure 1. The observations were necessarily discontinuous, and were confined largely to the days following the passage of cold fronts, so that the weather during each observation period was similar: usually cool, with little or no cloud cover and with variable north to northwest winds (the latter also given in Table 1). Observations in previous years have shown that comparatively little passerine diurnal migration takes place in other weather conditions. Also, field work of a different kind was carried out throughout the period at the Norman Bird Sanctuary (hereafter referred to as N. B. S.) in Middletown, and it is unlikely that any large movements could have been missed, except during the period Oct. 11th-19th. Thus, although we have little information on the day-to-day fluctuations in migration, our observations probably coincided with the heaviest migration periods.

We are greatly indebted to Dr. David B. Peakall and Mr. Richard Ferren for their assistance with field work on Sept. 2-3 and Nov. 12.

NOTES ON SPECIES

This section discusses the migration and behavior of the nine most frequently observed species, excluding water birds. A list of the other species of land birds noted during the season, with their observed directions of flight, is given in the Appendix.

Chimney Swift *(Chaetura pelagica)*

Swifts were seen migrating as early as Aug. 22 and as late as Sept. 28. The only sizable movement was on Sept. 2 when 22 passed Sakonnet

Point, mainly flying northwest, and 39 were seen at Swallows' Cave, mainly flying in from the east and continuing south or southwest. This movement continued throughout the day at the N. B. S., where another lighter movement was seen on Sept. 8.

Tree Swallow *(Iridoprocne bicolor)*

The only sizable movement observed was on Sept. 2. On this day 101 were seen passing Sakonnet Point, of which only 31 set out across the river, flying northwest or west with Barn Swallows. The remainder followed the coast northward, joining others arriving from the east, and a considerable portion of this coasting stream crossed the river from Fogland Point, where a flock of 320 were seen flying northwest. Later in the morning small numbers of Tree Swallows were seen flying west across the middle of Aquidneck Island, and birds were noted passing over the N. B. S. until late afternoon. However, during the early morning watch at Swallows' Cave only one Tree Swallow was seen, coasting north.

Tree Swallows have never been seen leaving Brenton Point in any numbers. Their apparent reluctance to make these short water crossings (at least at low altitude) is in direct contrast to the behavior of the Barn Swallow *(q.v.)*, and is interesting in view of the regular fall concentrations of this species at Middletown (near the N. B. S.) and at the southern end of Conanicut Island.

Barn Swallow *(Hirundo rustica)*

Barn Swallows were seen migrating on each count from Aug. 19 to Sept. 8. Generally they showed little hesitation on reaching the sea, a few remaining at the points for a short time and feeding, the majority setting directly out across the water. Most birds leaving Sakonnet and Brenton Points flew west or west-southwest, not always flying directly towards the nearest land; for example, some birds leaving Sakonnet Point on Sept. 2 headed directly towards the headlands of Point Judith, clearly visible some twenty miles away, and some on Aug. 22 were noted flying west far to the south of Brenton Point. Only on Sept. 2, in a stiff north-northwest wind, were any seen flying north of west; about half those seen leaving Sakonnet Point were flying northwest on the short crossing towards Sachuest Point.

On two occasions birds were seen from Swallows' Cave crossing the river on a broad front, a moderate movement on Aug. 20 and a smaller movement on Sept. 2, when 39 arrived from the east and joined others coasting south. During the same period on the 2nd, 88 were seen leaving Sakonnet Point, and a further 36 the next day, when only 17 coasting birds were seen at Swallows' Cave. Movements at Brenton Point were on a similar scale, 71 in 40 minutes on Aug. 19, 30 in an hour on Aug. 22 and 24 in 35 minutes on the 27th of August.

Barn Swallow movement took place mainly in the first three hours after dawn, and much less was seen in the afternoon than in the Tree Swallow or the Chimney Swift. As has been noted by many others, swallows flying with a head- or cross-wind flew low, often within a foot of the water, while those with a following wind (Aug. 27) were flying noticeably higher.

The numbers which we saw were comparatively small, in contrast to the vast migrations that have been seen further down the Atlantic coast (Stone, 1937; Nisbet, in press). This suggests that comparatively few Barn Swallows pass through southern Rhode Island, but it also is due in part to the fact that the swallow migration in the Narragansett Bay area takes place on a broad front: we found that there was no tendency for the birds to concentrate along the "guiding line" formed by either the southern coast or the shores of the river.

Common Crow *(Corvus brachyrhynchos)*

On Nov. 2 ninety-three were seen leaving Sakonnet Point in directions between west and northwest, the majority showing little hesitation over making the crossing. However on Oct. 25, 1957, under similar weather conditions, Crows left Brenton Point heading for Conanicut Island only after much hesitation and circling, and eight of the 35 birds eventually turned north along the coast. Two other significant movements were seen in 1958: one on Nov. 7 when 31 flew west-northwest across the Sakonnet River towards Black Point; the other on Nov. 8 when 40 flew west-southwest across the upper part of the river.

Robin *(Turdus migratorius)*

The Robins' diurnal movement was almost confined to the first hour after dawn. On Nov. 2 at Sakonnet Point 60 flew in from the east but turned north before leaving the point, and none were seen to cross. At the Hummocks 27 were seen on Nov. 8 coasting north on the east side of the river but 40 were seen on Nov. 2 flying northwest, crossing Mt. Hope Bay, with an additional 21 coasting south.

Starling *(Sturnus vulgaris)*

A large movement was seen on Nov. 8 when one observer, watching first at the Hummocks and later at Sandy Point, counted 43,228 between 0605 and 0845[1]. All of the birds were flying west-southwest into a light westerly wind, not being deflected by the river until the movement was almost over. At first they were in small scattered parties flying under 200 feet, but as the morning wore on the flocks observed became progressively higher, some passing at nearly 1,000 feet, and larger, containing up to 2,300 birds. Before 0700 the birds were passing on a broad front over the northern half of the Sakonnet River and Mount Hope Bay, while during the same period (0630 to 0745) only 800 were seen at Swallows' Cave. However, as the morning progressed the Starling stream narrowed and moved south, and by 0830 most of the birds were passing in the vicinity of Black Point. At 0900 a check at Swallows' Cave revealed that flocks of up to 1,500 birds were still crossing near Black Point, but the movement appeared to have stopped by 1000. Towards the end of the passage some large flocks were seen flying south on the east side of the river before crossing, and by midday large flocks were accumulating in the extensive thickets of Arrowwood *(Viburnum dentatum)* at the south end of Aquidneck Island, where aggregations of 10,000 or more birds remained for five days.

1.) All times given are in Eastern Standard Time

A somewhat similar movement had been seen on Nov. 2, when 3,334 Starlings were seen leaving Sakonnet Point between 0600 and 0830, mainly flying directly west towards Newport and not taking the short crossing to Sachuest Point. It is possible that on this occasion the migration was concentrated at Sakonnet Point, but one flock of at least 2,000 birds seen crossing the river in the vicinity of Black Point leads us to suspect that the bulk of the migration, as on Nov. 8, was passing well to the north of our observation point. Again similar to the events of the 8th, large numbers of Starlings appeared in the southeastern part of Aquidneck Island, and these flocks were evidently composed of different individuals from those seen leaving Sakonnet Point.

No significant Starling movements were seen before Nov. 2, and records at the N. B. S. in previous years have suggested that the main Starling migration is concentrated in the last week of October and the first half of November. However, diurnal migration of Starlings had not previously been reported from this area, except for a few birds seen at Brenton Point in 1957.

Myrtle Warbler *(Dendroica coronata)*

On Nov. 2 seventy-one birds were seen at Sakonnet Point, of which six flew out to the west, 20 to the northwest, and the remainder flew north along the coast after considerable hesitation. The only other definite record of birds crossing the lower part of the Sakonnet River is of three at Swallows' Cave on Nov. 7, but larger numbers were seen crossing at the Hummocks: 57 on Nov. 8 and 53 on the 12th. Most of the latter continued west or northwest, but a number were also seen coasting southwest along the northwest shore of the island.

Bobolink *(Dolichonyx oryzivorus)*

Although Bobolinks were prominent migrants at Brenton Point in 1956 and 1957, comparatively few were seen during our watches in 1958. A single flock of 30 was seen coasting north at Swallows' Cave on Sept. 2. The next morning (Sept. 3), with cloudless skies and a light northerly wind, none were seen or heard at Sakonnet Point, but two small flocks were seen at Swallows' Cave crossing the river at a great height, and a further five flocks were heard but were too high to be spotted easily. This suggests that there may have been many birds crossing the river too high to be seen from the ground. However, previous observation at Brenton Point in similar weather (e.g. on Sept. 4, 1956) has shown that the birds *start* the crossing at a low level, and if they were behaving similarly on Sept. 3, 1958 they must have avoided passing Sakonnet Point and crossed the river further to the north.

The dearth of migration in 1958 could also have been the result of a predominantly nocturnal migration: large flocks of restless Bobolinks were seen on Aquidneck Island at dusk on Sept. 1. Bobolinks were also heard a number of times at night during August and September, and on several occasions in Middletown have been observed to start their migration at dusk.

Brown-headed Cowbird *(Molothrus ater)*

On Nov. 2 at Sakonnet Point 153 flew out to the west and a further flock of 120 which arrived from the east circled and landed north of the point.

DISCUSSION

Reaction to water crossing

One of the most noteworthy results of our observations was the difference in behavior shown by different species when confronted with a water crossing. Some species, such as the Starling and the Barn Swallow, evinced little or no reaction to the shoreline; others showed marked hesitation and still others refused the crossings altogether. Since some of the species in the latter group (e.g. the Robin and the Eastern Meadowlark *Sturnella magna)* are primarily nocturnal migrants, it is possible that their movement in the early morning is merely a low intensity continuation of their nocturnal flight. Ball (1952), in studying the diurnal movements of Robins and other nocturnal migrants in the Gaspe Peninsula, observed still greater reluctance to cross very small stretches of water, and such behavior is hardly consistent with migration at full intensity. However, this would not explain one of the most prominent contrasts we observed—that between the behavior of the Barn and Tree Swallows—for both are exclusively diurnal migrants.

Of those species which refused the crossing at Sakonnet Point and turned north up the river, a few (e.g. the Robin) appeared to stop after flying a few miles inland, without having crossed at all. Others (e.g. the Myrtle Warbler) appeared to continue as far as the Hummocks, where the crossing is very narrow, but the Tree Swallows and some Yellow-shafted Flickers *(Colaptes auratus)* eventually crossed the river at Fogland Point or Swallows' Cave, where the crossing is almost as wide as at Sakonnet Point! Similar behavior has been noted in spring among Brown-headed Cowbirds and Blue Jays *(Cyanocitta cristata)*, which cross in largest numbers due east from Black Point. It thus seems likely that the factor deterring these species from crossing the river at its mouth is not solely the breadth of the water crossing, but the sight of the open ocean to one side. It is possible that the strength of the northerly wind (with its threat of blowing the birds out over the sea) might act as an additional deterrent, as has been noted in similar situations in Europe; so far we have no evidence for this.

Flight directions on Aquidneck Island

Once the Sakonnet River was crossed, many of the birds (e.g. Starlings and Tree Swallows) continued west across Aquidneck Island. We have not yet studied their behavior on reaching the west shore, but many of the Starlings seen on Nov. 8 from the Hummocks appeared to continue directly west-southwest. However, some species (Myrtle Warblers, etc.) were seen flying southwest down the northwest shore of the island on Nov. 12, and many of the birds that arrived at Swallows' Cave from the east also turned south down the coast, joining others that had presumably crossed the river farther north. Other species, such as the Starlings on Nov. 2 and 8, or the Tree Swallows on Sept. 2, although not coasting, turned south down the middle of the island to arrive in large numbers at the southern end. Indeed, this must be the normal

behavior of some species, for birds such as the Tree Swallow regularly occur at the N. B. S. in large numbers, although they rarely, if ever, cross the river so far south. Even such notoriously land-bound species as the *Buteo* hawks occur regularly in small numbers at the N. B. S. and Brenton Point, and we suspect that the concentrations of Bobolinks and Eastern Kingbirds at Brenton Point may arise from a similar migration pattern.

Guiding Lines

Using the European terminology (Van Dobben, 1953; etc.), the turning by birds to follow the shores of the Sakonnet River (in either direction) is an excellent example of the use of "guiding lines": the turning from the "standard direction" to follow well-marked topographical features. It is therefore remarkable that no species appears to have been concentrated significantly along the most important guiding line of all—the sea coast. On Sept. 2, for example, only about twice as many Barn Swallows passed Sakonnet Point as were seen crossing the river at Swallows' Cave, and although 3,334 Starlings were seen at Sakonnet Point on Nov. 2 there is some evidence that even larger numbers were passing farther to the north on this date. Even on these occasions the slight concentration at the coast may have been due to the drifting effect of the strong northerly wind. If many birds had been flying south or even southwest one would expect them to have "piled up" against the guiding line of the coast and have produced a large concentration there (Van Dobben, 1953). It seems more likely that the standard direction of the birds in this area is west-southwest and that comparatively few ever reach the coast.

Magnitude of the coastal migration

Except for one or two species, such as the Starling, or in previous years the Bobolink, the numbers we saw on the coast, even in ideal weather, could hardly be called large. Species such as the Bobolink and Eastern Kingbird, which were prominent in the fall migrations of 1956 and 1957, failed to appear in numbers in 1958. Moreover, other common diurnal migrants, such as the Blue Jay and the American Goldfinch *(Spinus tristis)*, passed only in very small numbers, and indeed are never abundant as fall migrants on Aquidneck Island.

As has already been suggested, the small numbers of a few of these species might be due to the fact that they are primarily nocturnal rather than truly diurnal migrants. In addition, there were indications that the Bobolink may at times migrate too high to be seen from the ground, and high level passage cannot be discounted for other species. However, the main migration route of the Starling undoubtedly lay several miles inland, and particularly in view of the absence of a concentration at the coast, as discussed under "guiding lines," we believe that the migration pattern of other species was similar. In some cases, of course, birds following a southwesterly trend through New England might be expected to pass well inland and avoid southeast Massachusetts and Rhode Island altogether. This is certainly true of the Blue Jay, which is always much more abundant in migration, both in spring and fall, farther to the west than in the Narragansett Bay area.

Northwestward flight at the water crossing

Special interest is attached to the northwestward departure of some passerine species (notably the Eastern Kingbird and the Bobolink) from Sakonnet and Brenton Points, although other species leaving these points depart in a west or southwest direction, following the trend of the coast. At Sakonnet Point this northwest flight effects the shortest crossing, but this is not the case at Brenton Point and another explanation is necessary.

If, as we have suggested for other species, the main migration route of these birds lies a little distance inland, this northwest flight might be interpreted as a "redirection" of migrants that have been led away from this route, and which are attempting to return. This phenomenon would then be analogous to the northwest flight of nocturnal migrants from outlying islands after offshore drift (Baird and Nisbet, in prep.). Additionally, such behavior upon reaching the coast would serve as a useful safety reaction by leading the birds away from the coast and the concomitant danger of offshore drift.

In either case it remains to be explained why this behavior is more highly developed in some species than in others, when it would appear to be equally useful to all. While much more work is needed on the migration of these species before their behavior can be fully understood, there is evidence that the Eastern Kingbird, Redwinged Blackbird, and Bobolink are more affected by guiding lines than some of the other species, and it may be that the northwest redirection has been developed in response to their greater need for protection against offshore drift.

SUMMARY

1. Intermittent observations were made of diurnal migration of landbirds in the Narragansett Bay area of Rhode Island during the fall of 1958. Particular attention was paid to the behavior of migrating birds confronted with water crossings.
2. Some species showed no reaction to the open waters of the lower bays, crossing without hesitation, others crossed only after much hesitation, while still others refused the crossing and turned north along the shore to cross farther inland. So far as we observed, wind strength had little effect on behavior.
3. Evidence for high level migration of at least one species was obtained.
4. After crossing the Sakonnet River many birds turned south down Aquidneck Island, leading to a concentration at its southern end.
5. There was no evidence for any significant concentration of migration along the sea coast, and larger numbers were seen inland.
6. With the exception of the Starling, the numbers seen were not large, and it is suggested that the main migration routes of the species concerned lie away from the coast.
7. Some species flew northwest when crossing the open water of the lower bays instead of following the trend of the coast WSW. It is suggested that these birds may have been redirecting their flight after wandering south of their inland migration routes, thereby reducing the risk of offshore drift.

REFERENCES

BAIRD, J., ROBBINS, C. S., BAGG, A. M. and DENNIS, J. V. 1958. "Operation Recovery"—the Atlantic Coastal Netting Project. *Bird-Banding*, **29**(3): 137-168.

BAIRD, J. and NISBET, I. C. T. in preparation. Reverse fall migration on the Atlantic Coast and its relation to off-shore drift.

BALL, S. C. 1952. Fall bird migration on the Gaspé Peninsula. *Peabody Museum Nat. Hist. Bull.* 7. New Haven, Conn.

NISBET, I. C. T. in press. Barn Swallow migration at Jones Beach. *Kingbird.*

STONE, W. 1937. Bird Studies at Old Cape May. Philadelphia.

VAN DOBBEN, W. H. 1953. Bird migration in the Netherlands. *Ibis*, **95**(2): 212-234.

APPENDIX: OTHER SPECIES SEEN MIGRATING

The following table lists all those species not treated specifically above, which we saw migrating in 1958 (for completeness, a few records from 1956 and 1957 are also included). The flight directions past the point of observation are given where the species was seen to cross the Sakonnet River or the mouth of Narragansett Bay. If a species was seen to reach the shore and turn north it is marked "turn"; if it stopped, it is marked "stop."

	Brenton Point	Sakonnet Point	Swallows' Cave	Hummocks
Great Blue Heron *(Ardea herodias)*	W.	—	—	—
Cooper's Hawk *(Accipiter cooperii)*	Turn.	—	—	—
Sharp-shinned Hawk *(Accipiter striatus)*	W; turn.	—	W.	—
Red-tailed Hawk *(Buteo jamaicensis)*	Turn.	—	—	—
Red-shouldered Hawk *(Buteo lineatus)*	Turn.	—	—	—
Broad-winged Hawk *(Buteo platypterus)*	Turn.	—	—	—
Marsh Hawk *(Circus cyaneus)*	W; SW.	Turn.	—	—
Osprey *(Pandion haliaetus)*	NW; W; SW.	W; SW.	SW.	—
Pigeon Hawk *(Falco columbarius)*	W.	WSW; turn.	—	—
Sparrow Hawk *(Falco sparverius)*	NW; W; turn.	Turn.	W.	—
Semipalmated Plover *(Charadrius semipalmatus)*	W.	—	NW.	—
Killdeer *(Charadrius vociferus)*	W; WSW.	WSW; SW.	SW.	—
Whimbrel *(Numenius phaeopus)*	—	W.	W.	—
Greater Yellowlegs *(Totanus melanoleucus)*	SW.	—	—	—
Lesser Yellowlegs *(Totanus flavipes)*	—	—	SW.	—
Pectoral Sandpiper *(Erolia melanotos)*	SW.	—	—	—
Semipalmated Sandpiper *(Ereunetes pusillus)*	—	W.	—	—
Mourning Dove *(Zenaidura macroura)*	—	NW; stop; turn.	NW; W.	—
Ruby-throated Hummingbird *(Archilochus colubris)*	NW; S.	—	SE.	—
Belted Kingfisher *(Megaceryle alycon)*	—	—	SW.	—
Yellow-shafted Flicker *(Colaptes auratus)*	—	Stop; turn.	NW; W.	SW.
Yellow-bellied Sapsucker *(Sphyrapicus varius)*	—	—	W.	—
Hairy Woodpecker *(Dendrocopos villosus)*	Stop.	—	—	—
Downy Woodpecker *(Dendrocopos pubescens)*	—	—	—	SW.
Eastern Kingbird *(Tyrannus tyrannus)*	NW; WNW; W; turn.	—	W.	—
Western Kingbird *(Tyrannus verticalis)*	Stop.	—	—	—
Horned Lark *(Eremophila alpestris)*	—	NW.	NW.	W.
Bank Swallow *(Riparia riparia)*	W; turn.	—	W.	—
Rough-winged Swallow *(Stelgidopteryx ruficollis)*	W; turn.	—	—	—

Cliff Swallow *(Petrochelidon pyrrhonota)*	SW.	W.	—	—
Purple Martin *(Progne subis)*	Turn.	—	—	—
Blue Jay *(Cyanocitta cristata)*	—	W; turn.	—	W; SW.
Blue-gray Gnatcatcher *(Polioptila caerulea)*	—	—	W.	—
Water Pipit *(Anthus spinoletta)*	WNW; W.	WNW.	—	—
Cedar Waxwing *(Bombycilla cedrorum)*	NW; turn.	—	—	—
Black and White Warbler *(Mniotilta varia)*	Stop.	—	—	—
Yellow Warbler *(Dendroica petechia)*	Stop.	—	—	—
Magnolia Warbler *(Dendroica magnolia)*	—	—	NW.	—
Prairie Warbler *(Dendroica discolor)*	Stop.	—	—	—
Palm Warbler *(Dendroica palmarum)*	—	—	W.	—
Northern Waterthrush *(Seiurus noveboracensis)*	Turn.	—	—	—
Yellowthroat *(Geothlypis trichas)*	—	Stop.	W.	—
Eastern Meadowlark *(Sturnella magna)*	Turn.	Turn.	—	—
Redwinged Blackbird *(Agelaius phoeniceus)*	NNW; NW.	W.	W.	WSW; SW.
Baltimore Oriole *(Icterus galbula)*	Turn.	NW.	—	—
Rusty Blackbird *(Euphagus carolinus)*	Turn.	—	—	—
Dickcissel *(Spiza americana)*	NW; turn.	—	—	—
Purple Finch *(Carpodacus purpureus)*	—	—	—	SW.
Pine Siskin *(Spinus pinus)*	Turn.	—	—	—
American Goldfinch *(Spinus tristis)*	Turn.	NW; W; turn.	W.	NW; WSW.
Savannah Sparrow *(Passerculus sandwichensis)*	—	Turn.	—	—
Slate-colored Junco *(Junco hyemalis)*	—	—	—	NW.
Snow Bunting *(Plectrophenax nivalis)*	—	NW; W.	—	—

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GENERAL NOTES

A Method for Opening Nesting Holes.—The study of hole-nesting birds presents problems of access not met with among other species. Certain species nest in abandoned woodpecker holes which are normally too small to permit the insertion of a hand. Some recent workers in British Columbia have opened such nests by cutting a panel from the sill below the hole; such panels can be nailed into place again with little resultant change in the appearance of the nesting site. Repeated opening of the nest by this means, however, usually results in the panel becoming permanently loose, particularly if the wood is rotten or the sill thin. Dr. I. McT. Cowan suggested that a hole drilled from the back or side of the tree would avoid this difficulty.

Holes of a suitable size may be made with a brace and 3-inch expansion bit, and by preliminary measurement one can place the hole close above the eggs for more convenient observation. Sapwood often clogs the big bit; in such cases it was usually found more satisfactory to start with the big bit and continue with a smaller (½" or ⅝") bit, finishing up with a keyhole saw. The same modification was used when the wood was too rotten to hold the lead screw of the big bit. In all cases the round hole is readily plugged with a section of 3-inch dowel, and such plugs are usually covered with bark to render them less conspicuous.

The method was devised for use upon the nests of Bufflehead *(Bucephala albeola)*, but is of course applicable to those of any species using holes of Flicker *(Colaptes sp.)* size or larger. It has been used throughout the past summer and was generally found entirely satisfactory. The method was tested upon a nest of Common Sapsucker, but was considered less satisfactory with the smaller cavity excavated by that species.

Besides retaining the original appearance of the site, this method was also found to facilitate banding of the birds. With other methods it is necessary to insert one's hand and arm into the hole to bring out its occupant. With ducks this almost invariably results in the fouling of the eggs, and in any case makes the bird ruffled and distrustful of the nest from which it was dragged. When the bird is prodded through the new hole it leaves quietly through the normal opening and may be easily caught in a net held over the entrance. Most of the distrust thus created, as well as any fouling, was probably concentrated upon the net.

One limitation of the method is that one can not operate a brace and bit from a precarious perch. In such cases the cut-out panel is almost obligatory although the use of a "safety belt" greatly extends the use of the present method.

Mr. A. J. Wiggs performed much of the actual drilling operations, and suggested the variation used when the big bit was not feasible.—A. J. Erskine, Dept. of Zoology, University of British Columbia, Vancouver 8, B. C.

Two 13-year-old age records for the House Sparrow.—Some longevity records for the House Sparrow *(Passer domesticus)*, widely known in this country as the English Sparrow, have been published by S. S. Flower *(Proc. Zool. Soc.* London, ser. A. 95: 1378. 1925; 108:200. 1938). These records are based upon caged birds. One bird lived for 11 years, 5 months, and one day, another bird for 14 years, and a third reached the age of 23 years. Dayton Stoner *(Auk* **59:** 440-442, 1942) reported on another caged House Sparrow which was taken as a nestling and kept in captivity for 12 years. Longevity records of birds living in the wild are not easily obtained, and undoubtedly do not often reach the extreme age of caged birds.

At the time my study of banding House Sparrows was published *(Bird-Banding* **20:** 40-50. 1949), the oldest recovery I had obtained was nearly five years old. Since then two of my banded sparrows have been recovered which extend the longevity record to somewhat over 13 years. These two (nos. 43-129716 and 43-129740) were banded as immature birds on June 13 and 24, 1944, respectively, on the roof of McGilvrey Hall at the campus of Kent State University. These were never recaptured by the writer, although many of those banded about the same time were later retaken in the same traps or others nearby as reported in the reference above. In October of 1957 these two were captured in a sparrow trap by Mr. and Mrs. Jesse Pirl at 711 Crain Ave. in Kent, Ohio, about 0.4 mile away from the site of banding. Unfortunately the carcasses of these birds were destroyed before the writer learned of their recapture. Mrs Pirl believes that both specimens were males. It would be interesting to speculate how long these birds might have lived if they had not been destroyed as pests at a feeding station.—Ralph W. Dexter, Dept. of Biology, Kent State University, Kent, Ohio.

Some Long Distance Barn Owl Recoveries.—On 1 July 1953 we banded a brood of six nestling Barn Owls *(Tyto alba)* in the Town of Granville, Milwaukee County, Wisconsin. Two of them were subsequently found dead at points over 1200 miles distant, a greater distance than has been previously recorded (see Stewart, *Auk* **69:** 227-245, 1952, and Broun, *Bird-Banding* **25:** 149, 1954). One of the Owls (557-56405) was found at Delray Beach, Palm Beach County, Florida, on 25 November 1953, and 557-56407 was recovered 6 June 1954 at Miami, Florida.

We captured and banded an adult Barn Owl (557-56442) in the Town of Mequon, Ozaukee County, Wisconsin, on 11 July 1955. On 1 November 1955 it was captured on a ship 225 miles due east of Savannah, Georgia, about 940 miles from the place of banding. The bird was kept captive, fed raw meat, and released 4 November on the Mississippi River about 65 miles south of New Orleans.—Helmut C. Mueller, Department of Zoology, University of Wisconsin, Madison, and Daniel D. Berger, Cedar Grove Ornithological Station, Route 1, Cedar Grove, Wisconsin.

A Second Peregrine Falcon Banding Return from Uruguay.—On 1 October 1941 Murl Deusing trapped and banded an immature Peregrine Falcon *(Falco peregrinus)* at Cedar Grove, Sheboygan County, Wisconsin. This bird was recovered near Buschental, Department of San Jose, Uruguay on 8

December of the same year. (See Cooke, M.T., 1943, *Bird-Banding*, **14**: 72). On 27 September 1954 we trapped and banded an immature male Peregrine (546-12230) at Cedar Grove, and 2 March 1955 it was shot near Montevideo, Uruguay, less than 70 miles from the locality of the above return. The straight line distance between banding and recovery is about 5900 miles, and the approximate distance of a probable route (across the Caribbean via the Antilles and then along the Brazilian coast) is 9000 miles.—Helmut C. Mueller, Department of Zoology, University of Wisconsin, Madison, and Daniel D. Berger, Cedar Grove Ornithological Station, Rt. 1, Cedar Grove, Wisconsin.

Orange Crown Patches in Male Ruby-crowned Kinglets.—The following statistics are the result of Fall netting near Monkton, Maryland:

Ruby-crowned Kinglets

year	*number banded*	*females*	*males (red crown patches)*	*males (orange crown patches)*
1955	30	17	13	0
1956	76	31	44	1
1957	54	16	20	18

In 1957 the orange crown patches of four individuals were a lighter orange and one a darker orange than the average. Although Ruby-crowned Kinglets were banded from September 29, 1957 to October 23, 1957, the ones with orange crown patches were captured on October 22 and 23.

Bent (1949, *Life Histories of North American Thrushes, Kinglets and their Allies*, Smithsonian Inst., Washington, D. C.) reports that on occasion the young male will assume an orange or yellowish crown patch rather than the normal red one, but that this is a rather rare occurrence.—Stephen W. Simon, 402 Sharp St., Ashland, Ohio.

RECENT LITERATURE

BANDING

(See also Numbers 30, 33, 41, 61)

1. Recovery in Denmark 1900-1955 of Birds Ringed Abroad. (Genfangster i Danmark 1900-1955 af fugle ringmaerkede i udlandet). Ella Adelholt. 1958. *Dansk Ornithologisk Forenings Tidsskrift*, **52** (3-4): 153-280. (With explanatory summary in English). This long list gives the raw data for almost all the birds banded abroad and recovered in Denmark over a 55-year period. Most of the records are from the literature (each is referred to its source in the bibliography), but a few are hitherto unpublished. Lists of this sort, despite the labor of compiling and the cost of publishing them, are exceedingly useful, and one wishes that similar ones could be done for other areas. Students of African faunistics, for instance, would welcome a compilation of the African recoveries of birds banded in Europe, but locating those that have been published, most of them in minor journals of limited circulation, is an almost impossible task, even in the largest and most complete libraries. How ornithology would benefit if the wealth of information scattered in the many small banding schemes throughout the world were deposited in some central repository for all to use! We welcome the publication of lists such as this one where they are economically feasible.

Here in the United States our banding data have long been so voluminous that publishing them *in toto* is financially impossible. While they are all available on IBM cards at the Patuxent Research Refuge in Laurel, Maryland, just processing and maintaining these records consumes a major portion of the Fish and Wildlife Service's limited appropriations, and leaves little or none for disseminating them further. The staff of the Banding Office is always glad to help any qualified researcher who can hie himself to Patuxent to dig the information he needs out of the files, and many ornithologists are now availing themselves of the opportunity. Far too many, however, are either unaware of this invaluable mine of information, or are unable to get to Patuxent to prospect in it. Something should be done to make fuller use of our rapidly mounting banding data, particularly for non-game species. But what?—O. L. Austin, Jr.

2. Report on Bird Ringing for 1957. Robert Spencer. 1958. *British Birds*, **51** (Supplement): 449-487. The total figure reached 186,346 birds of which 49,286 were nestlings or chicks, 137,060 juveniles to adults. Recoveries during 1957 came to 5,497. All the species ringed are listed—both those in 1957 and the grand total since 1909. The bulk of the paper is concerned with listing the more important recoveries of birds found at a distance. Two Manx Shearwaters *(Procellaria puffinus)* were taken in Brazil. Interestingly enough, Kestrels *(Falco tinnunculus)* ringed as nestlings in 1957 showed contrasting migratory behavior. Of two ringed near Moniaive in June one was found dead in November 7 miles east, the other was shot in France; of two ringed in Cumberland, one was found in December 85 miles south of its birthplace, the other was shot in France. Of 2 birds from the same brood ringed on the Isle of Man, one was shot in November 115 miles northwest, the other was reported dead in Spain; and of two others from the same brood ringed near Everly, one was shot in December 42 miles to the southeast, and the other in November in France. An adult Sanderling *(Crocethia alba)* was ringed Sept. 9, 1957 and shot one month later in Poti, Georgia, U.S.S.R. "This remarkable recovery is the first for the species. Poti is *ca.* 2,200 miles southeast of Holy Island, the most direct course lying mainly overland." An adult Wryneck *(Jynx torquilla)*, ringed in Yorkshire Sept. 4, 1956 was taken in Sweden May 27, 1957. "This is the first foreign recovery of a Wryneck and is of considerable interest. The recovery locality is near the northern limit of the species. The bird was ringed at the time of one of the greatest drift arrivals of northern species in recent years and may well have been involved in that movement."

This whole report is admirably organized and full of valuable information on the movements of British birds.—M. M. Nice.

3. British Recoveries of Birds Ringed Abroad. E. P. Leach. 1958. *British Birds*, **51** (Supplement): 487-496. This selective list omits some species and gives only significant records of others. Golden Plover *(Charadrius apricarius)* came from Iceland and Holland, Lapwings *(Vanellus vanellus)* from Finland, Germany, Czechoslovakia, and "one ringed in Norway was in its thirteenth year when killed in Ireland. . . . The heavy infiltration of young Great Black-backed Gulls is a factor to be taken into account in bird protection, and Herring Gulls are now shown to come in from the north of that country on a significant scale."—M. M. Nice.

4. Modifications of Ruffed Grouse Traps. Robert E. Chambers and P. F. English. 1958. *Journal of Wildlife Management*, **22**(2): 200-202.—The basic design of the mirror trap is maintained in a collapsible, portable version with no change in efficiency. The effectiveness of the cloverleaf trap is increased by addition of end cages.—Andrew A. Arata.

5. The Use of Mist Nets for Capturing Nesting Mourning Doves. Stanley W. Harris and Marius A. Morse. 1958. *Journal of Wildlife Management*, **22**(3): 306-309. The authors describe several variations of a basic technique of setting a net near a nesting *Zenaidura carolinensis* and "panicking" (the verb is theirs) the brooding bird into it. Working with nesting birds, even just observing a nest closely, always involves a certain amount of jeopardy to nesting success. Most students of nesting phenomena do their best to disturb their subjects as little as possible, both to ensure observations unaffected by their presence and to avoid unintentional mortality. While the methods recommended here are doubtless efficient for catching nesting doves, and probably the only ways certain ones can be caught, the disturbance they entail cannot help being harmful to nest, eggs, and young. Having had considerable experience both with mist nets and with nesting doves, though I have never combined the two, I am a bit suspicious of the author's claim that their "operations had little or no effect on over-all nesting success" and of the data they present to substantiate it.

Being somewhat responsible for introducing mist nets to occidental ornithology, I am perhaps overly sensitive to their potential misuse. They are not without their hazards to the birds they catch, though careful setting and tending reduce these to an inconsequential minimum. Nor do they lack their critics among the more rabid ornithophiles. I regret the publication of this paper because its implied callousness to the welfare of the birds being studied could provoke

further criticism of netting and, though the fault here is not with the net but with the way it is used, further threaten the use of this most efficient and, properly handled, safe and humane method of catching birds for banding.—O. L. Austin, Jr.

MIGRATION

(See also Numbers 33, 43)

6. Fall Migration of the Dragon-fly Anax junius. Aaron M. Bagg. 1958. *Maine Field Naturalist*, **14**(1): 2-13. The movements of insects, particularly of the large ones, have a twofold bearing on studies of bird migration: (1) to the extent that these movements resemble migration, they perhaps provide clues for a better understanding of that phenomenon; (2) insects in the upper air probably introduce a certain amount of contamination into radar data concerning migrating birds and to somewhat lesser extent into lunar data as well. The present paper should prove valuable to migration students not only for these reasons but also because the author, well-known for his skill in correlating large-scale weather processes with migration developments in spring, here applies his insights to the meteorological situations of fall.

Drawing upon references in the entomological literature, communications from observers, and his own experience, Bagg produces evidence that the emigrations of large dragonflies are directed movements, essentially of a north-south character, bearing a remarkable resemblance to the southward passage of diurnally migrating birds. Dragonflies, butterflies, and birds seem to travel at the same season, to follow similar routes, and to react to many external factors in a similar way. Simplified weather charts are used to show that the big autumn flights commonly take place during an eastward or southeastward flow of polar air following the passage of a cold front. In such weather the insects even respond to the "guiding lines" or "containing lines" in concert with the birds and pass in dense processions along sea coasts.

The paper alludes to the possible "triggering" action of polar air as a stimulus to emigration, but it may be significant that *all* the spectacular dragonfly flights were observed where either coasts or mountain ranges provided containing lines. Therefore, it is not improbable that appreciable, but more diffuse, dragonfly movements may be occurring with radically different meteorological situations but are not made manifest until most of the insects from a large area are compressed into a dense stream along the containing line. If this be the case, it might explain why there has been only meager evidence of a return flight of dragonflies in spring.—R. J. Newman.

7. Watching Migrant Birds by Radar. David Lack. 1958. *Listener*, **60** (1544): 691 and 694. Illuminating though they are, the recent studies of migration by radar in Switzerland have been severely restricted in scope by their fixed vantage point at the interior of a continent. Now in a brief popular treatment, David Lack brings us news of results being obtained by more powerful radar installations on the coast of Britain, which are capable of detecting small birds at a range of 60 miles. By this means the reality of large flights of land birds over the sea has been directly confirmed. Indications are that the birds fly at speeds of 30 to 40 m.p.h., most commonly between 2000 and 4000 feet above sea level, too high to be detected by the naked eye. Under certain conditions, at least, large-scale invisible migrations may occur even over land in daylight, in regions where their passing has previously been unsuspected. Transmarine migrants apparently are able to navigate without landmarks but are unable to make allowance for drift. Hence, when there are crosswinds at sea, their course becomes the resultant between their constant heading and the direction and speed of the wind. When the birds are denied a view of the stars, they evidently mill about aimlessly until the air movement at length piles them up exhausted on the shore. A southward migration down the North Sea in April, revealed by radar, is interpreted as the redirected movement of continental migrants known to have drifted off course to Britain a week earlier. These findings, like those of the Swiss, dovetail well with conclusions derived from the lunar study of migration in the New World and give these conclusions new re-enforcement amid the welter of conflicting possibilities.—R. J. Newman.

8. Determinations of Flight Elevation with Optical Range-finding Apparatus. (Ermittlung von Flughöhen mit optischem Entfernungmessgerät.) H. Rittinghaus. 1958. *Die Vogelwarte*, **19**(2): 90-97. The data here assembled consist of 289 records of the flight elevations of migrating Hooded Crows, Rooks, Jackdaws, Lapwings, and Golden Plover. These were obtained over a period of years by the author and his associates chiefly by means of range-finding equipment of the sort used on anti-aircraft guns. The minimum elevation noted was 1 meter (for Lapwings) and the maximum 750 meters (for Rooks), but the paper makes no attempt to correlate the observed variations with meteorological conditions (which, however, are stated) nor to subject the records to statistical treatment even for simple descriptive purposes.

Since the observations were conducted on a low-lying island well removed from the mainland, irregularities in topography were not a complicating factor. Flight elevation above sea level and above the surface were virtually one and the same thing. By the same token, the results cannot be used to gain a reliable idea of the typical altitudes of flight in nonmarine situations. In fact, the work with radar discussed in the preceding review has rather definitely shown that migrants mount higher into the sky as they fly out over the sea.

It is not clear whether the technique employed produces an unbiased sample—that is, whether the apparatus provides an equal opportunity to make measurements at all elevations. American students of bird migration who may be wondering whether optical range-finders might be useful in helping to solve some of their own most obstinate problems will have to read between the lines to decide. It is perhaps significant that the subjects of the present study are all fairly large, whereas the birds that are our most critical concern are all fairly small. One thing is certain: the equipment described by Rittinghaus, with a magnification of only 12 diameters, is not sufficiently powerful even to detect certain of the large diurnal flights of passerines that have been observed high aloft in spring passing inland over the northern shores of the Gulf of Mexico.—R. J. Newman.

9. Repetition of an Experiment on Bird Orientation. Klaus Hoffman. 1958. *Nature*, **181**: 1435-1437. The ingenious but controversial sun-arc hypothesis of Matthews holds that displaced birds discover whether they are north or south of their home latitude by extrapolating the path of the sun to the noon position. The main evidence for this kind of navigation was provided by two "sun-occlusion" experiments. By denying homing pigeons a view of the sun during a period of drastic change in its declination, Matthews was apparently able to fool the birds, in accordance with the predictions of the theory, into thinking that south was north and into flying off upon release in a direction opposite to the home direction. Later, several attempts in Germany to repeat the experiment failed utterly to reproduce the original result.

Now, in an effort to duplicate the conditions of Matthews' experiment more exactly, the German investigators have transferred their base of operations to the vicinity of the original tests in England and have worked with English pigeons purchased from the dealer who supplied Matthews. And again the sun-occluded birds have homed as well as the controls, lending no support whatever to the sun-arc hypothesis. The circumstances surrounding any outdoor experiment are, of course, so subtle and so complex that they can never be recreated with complete fidelity. In addition, there are apparently slight differences in the way Hoffman and Matthews trained their birds and perhaps in the way they released them. And if the conflict in testimony seems mystifying even so, it at least has ample precedent in the checkered history of homing experiments. —R. J. Newman.

10. Visible Migration in the East Baltic Area. Erik Kumari. 1958. *Ibis*, **100**(4): 503-514. More than half this very general account of results obtained by the growing network of daytime observation posts in Estonia, Latvia, Lithuania, and North Germany is devoted to the movements of water birds and is mainly of regional interest. Ornithologists in this country may, however, find food for thought in the discussions of passerine migration. The latter phenomenon is envisioned as a complex of streamlike movements, which are much more spectacular along the coast than in the interior and which, depending on the features of the landscape, vary drastically from station to station both in

quantity of birds and species composition. As in the eastern United States, the crest of fall migration is supposed to occur in September and October, and the best autumnal concentration points are said to be either on islands or on peninsulas that trend in a southwesterly direction. The surprising magnitude of visible diurnal migration in Europe is illustrated by the observation of more than a million birds, 98 percent of them Passeres, on the east shore of Courland Bay during an autumn's flight. The fact that the main body of migrants there, as well as at other places, was made up of fringillids emphasizes the importance of daytime travel in the migrations of birds of that family. It should perhaps suggest to American investigators that our preoccupation with seed-eating birds in experimental work may be delaying a full understanding of the mechanics of nocturnal migration.—R. J. Newman.

11. Autumn Migration in Southwest Portugal, 1957. Jennifer Owen. 1958. *Ibis*, **100**(4): 515-532. Cape St. Vincent, Portugal, is situated at the tip of the southwesternmost jag on the continent of Europe, far west of the short crossing to Africa over the Straits of Gibraltar. Fall migrants leaving this strategic point must traverse more than 200 miles of open ocean before they again see land. From August 23 to September 25, 1957, a party of British ornithologists made observations of airborne diurnal migrants in the Cape area, conducted mist-netting operations, and kept counts of grounded birds. They found the visible migration of small passerines aloft to be spasmodic, consisting of solitary birds or flocks of 5 to 10 individuals and rarely totaling more than 50 birds in a day. Virtually all these migrants departed out to sea in a south or southeast direction. Mist-net catches indicated a marked movement of small passerine night migrants into and out of the area, but cold fronts to the north seemed to block this movement.

Particularly intriguing was the presence at the Cape of species whose breeding ranges lie east of that region—birds that must partially reverse course to reach their wintering grounds and that, in so doing, undertake a needlessly long water crossing. Ordinarily, one might ascribe this odd situation to displacement through migrational drift. But the prevailing winds of the period were from the northwest. They were not of a sort to produce such displacement. Indeed, we are told that such conditions favor concentrations of migrants at the Cape, whereas air flows with an easterly component, the kind that should favor drift, bring few birds!

The report makes no attempt to resolve this enigma, and the non-European reader who tries to draw his own conclusions is likely to be discouraged by seemingly contradictory statements regarding methods, results, and interpretations. For example, the author says, "we took a mist-net with us," apparently implying that the catches described were made with a single net, but later speaks of "using mist-nets" (plural). The text twice reiterates that "in all 176 birds were caught," yet a footnote giving a species-by-species breakdown lists 1776. At one point the following comment appears: "Presumably any bird reaching Cape St. Vincent . . . and faced with a sea-crossing would be more likely to continue if the local weather was good. . . . Thus it is not certain whether the absence of birds indicates a lack of night migration." Yet otherwise the whole viewpoint of the analysis seems to be based on the unverifiable and explicitly stated opposite presumption: "We found that by using mist-nets we were able to get a reasonably accurate impression of the migration on the previous night." The observation period extended over a whole lunation and skies were "consistently clear." Under these circumstances, the reviewer finds it hard to understand why, after journeying all the way to Portugal expressly to study migration, the party made no effort to secure direct information on nocturnal bird movement by watching the moon—information without which the other data remain ambiguous.—R. J. Newman.

12. Observations on the Autumn Migration of 1957 in Southern Spain. J. F. W. Bruhn. *Ibis*, **100**(4): 532-533. This short note concerns observations on the Mediterranean side of the Iberian Peninsula made at the time of the studies in Portugal described in the preceding review. It shows markedly inferior evidences of small-bird migration, except in the case of swallows, and supports the existing belief that in September and early October the narrow sea-crossing at the Straits of Gibraltar is of little importance except to large soaring birds.—R. J. Newman.

13. Autumn Immigration of Redwings *Turdus musicus* into Fair Isle. Kenneth Williamson. 1958. *Ibis*, **100**(4): 582-604. This represents another of a series of investigations into migrational phenomena based upon attempted correlations between the geographical forms of birds arriving at Fair Isle Bird Observatory, Scotland, and analyses of meteorological conditions preceding and coinciding with their appearances.

Williamson's correlation in this paper of sporadic immigrations of Continental *(Turdus m. musicus)* and Icelandic *(T. m. coburni)* forms of the Redwing to Fair Isle with the passage of large-scale pressure systems depends upon two basic premises he advanced in earlier papers: (1) that the principal stimulus to migration is lack of wind plus clear skies, conditions most frequently associated with anticyclonic or high-pressure systems and, (2) that in the absence of navigational aids flying birds are subject to down-wind drift in the direction of wind-flow, rather than a resultant of wind velocity in one direction and flight speed in another, positively oriented, direction. Down-wind drift is frequently associated with cyclonic or low-pressure systems which carry unfavorable weather.

The arrival of the Continental Redwings at Fair Isle is usually associated with easterly or southeasterly winds. The largest influxes are associated with easterly winds flowing along the southern edges of anticyclones centered over Scandinavia to the east and northeast. Smaller influxes are associated with easterly winds resulting from frontal conditions preceding the arrival of cyclonic systems.

It is claimed that these thrushes are displaced by wind-drift from their north-south over-water crossing between Norway and Denmark (the Skaggerrak) and are blown in a northwesterly direction to northern Britain. Only during periods of calm air between the passage of wind systems do Redwings arrive at Fair Isle by direct southwesterly flight from the western Norwegian coast.

Conversely, most of the Icelandic Redwings arriving at Fair Isle do so in conjunction with cyclonic westerly winds. As pointed out by Williamson, to assume down-wind drift from Iceland would violate both of the above basic premises: birds would have to leave Iceland under cyclonic influence, and direct down-wind drift should deposit them on the shores of central Norway. To circumvent these difficulties, Williamson suggests that the birds must move west across the Denmark Straits to Greenland (which is under the influence of a prevailing anticyclone), south along the Greenland coast, thence east by down-wind drift to Britain.—Stuart Warter.

14. Attraction of Nocturnal Migrants by the Lights on a Television Tower. W. W. Cochran and R. R. Graber. 1959. Wilson Bulletin, **70**(4): 378-380. This excellent little paper, based mainly upon investigations made during the dark hours of two spring mornings, is packed with interesting conclusions: (1) migrants are attracted by red lights on television towers; (2) they are not evenly distributed in the sky to begin with; (3) they accumulate around the tower much as they have been shown to do in ceilometer beams; (4) only a small proportion of the birds drawn to the lights are actually killed; (5) migrants are little affected by TV towers when the cloud ceiling is high.

Data supporting these conclusions were obtained by watching the migrants in the beam of a spotlight, by comparing the numbers of flight calls heard at the tower versus the numbers heard away from the tower, and by comparing the numbers heard at the tower with the lights on versus the numbers heard with the lights off. These methods, of course, are not absolutely trustworthy. The use of a searchlight beam can certainly be expected to influence the behavior of the birds, and we cannot be sure that even the red lights do not have a stimulatory effect on the frequency with which migrants utter call notes. It would seem that the first conclusion is convincingly demonstrated, that the second hinges on one's definition of evenness, and that the last has already been thoroughly refuted by the massive mortality reported under lofty overcasts at several towers in the fall of 1958. The other two conclusions would seem to require further study before they can be accepted as valid generalizations.—R. J. Newman.

15. An Analysis of Migrating Birds Killed at a Television Tower in East-Central Illinois, September 1955-May 1957. Richard Brewer and J. A. Ellis. 1958. *Auk*, **75**(4): 400-414. At the scene of the studies described in the

preceding review, 486 dead or injured migrants of 51 species were retrieved on seven dates extending over four migration seasons. This total is a modest one compared with casualties that have occurred elsewhere, and it was not the product of the sort of organized day-to-day search that lends such data maximum significance. Nevertheless, the authors have followed the example of Tordoff and Mengel *(Univ. Kansas Pub. Nat. Hist.*, 10: 1-44) in making the most of the material collected. They have determined the relative numbers of each sex and age group recorded the fat condition of each specimen. Surprisingly, they report that adults predominated among the birds killed and that migrants tended to become fatter as the season progressed. By means of a novel *index of similarity*, they have compared the species composition of their kills with the composition in 24 other nocturnal disasters. On this basis, their TV-tower samples are more similar to the results recorded at ceilometers than to the results obtained at other television towers.

In the concluding section of the paper, the number of birds killed is used to compute the total number of migrants passing the tower on a given night in a space a mile wide. It would appear, however, that the authors themselves do not consider this method of estimate a very dependable one. They say it may be of little value if birds aggregate in migration or are attracted to the tower and then express the belief that aggregation may be pronounced. It is instructive to note that, if the same mathematical procedure were applied to the estimate of 20,000 birds killed at a television tower in Wisconsin one night in 1957, the computed number of passing migrants per mile of front would exceed the utterly fantastic figure of 38 million!

Two pieces of circumstantial evidence bearing on attraction and aggregation are mentioned. Maintenance personnel at another tower in the area found fewer dead birds lodged in the structure at the level of the lights than at other levels, as though the migrants had tended to avoid the lights. And on one of the dates the odd distribution of the dead birds on the ground—all on the east side of the tower, as though they had been killed by striking a single guy wire—suggested that migration had been moving in a concentrated stream.—R. J. Newman.

16. The autumn migration at Falsterbo in 1954. Report No. 12 of the Falsterbo Bird Station. (Fågelsträcket vid Falsterbo år 1954.) Ingvar Lennerstedt. 1958. Vår Fågelvärld, **17**: 303-331. (English summary.) The experience gained in the course of the years by the field observers at the Swedish bird stations of Falsterbo and Ottenby is beginning to tell in a remarkable way. Not only is this evident in the revelations of significant facts through the statistical analyses, but in the uncovering of important phases of behavior, which considerably improves our knowledge why and how birds move. Thus, of interest as it is that nearly 300,000 Chaffinches *(Fringilla coelebs)* flew over Falsterbo during the fall migration 1954 and that the Brambling *(Fringilla montifringilla)*, the Ortolan Bunting *(Emberiza hortulana)*, and the Wheatear *(Oenathe oenanthe)* reached all-record peaks in the same fall, the account of a single day of migration, 15 Oct. 1954, with its detailed observations of behavior and the analysis of relative factors, particularly the weather, enables the author to speak with assertion about why birds move when they do. Report No. 12 contains also other instances of revealing behavior, as that of the Red-breasted Mergansers *(Mergus serratus)* which during this fall accumulated in great numbers off Falsterbo. Apparently in a kind of premigratory preparation, a small flock would suddenly lift from the water. The sight of them drew raft upon raft of their fellows into the air until, like an avalanche of snow gathers on a mountain side, the whole mass of ducks was aloft to fly, perhaps, a few hundred yards or even a kilometer or two before settling on the water once more. This happened over and over again. Finally, only a few at a time flying away in their "standard" SW direction, the assembly of ducks thinned out and disappeared. The Wheatear is a night migrant but appears also regularly in diurnal migration. All of a sudden, it starts off in a bouncing flight towards the shore, hugging the ground. Some of them alight at the water's edge for a minute or two before taking off again with apparent determination out over the tops of the waves. Astonishingly few show any hesitation and return. Thus the author finds an answer to almost every question. All are concerned with environmental conditions, particularly

the weather. Once the birds are on the move, he concludes, there is no need looking to the manifestations of their internal rhythm and motivation for explanation of the variations they show in movement and behavior.—Louise de K. Lawrence.

POPULATION DYNAMICS

(See also Numbers 19, 21, 30, 33, 35, 61)

17. Winter mortality of the Tawny Owl in central Sweden. (Om dödligheten under vinterhalvåret hos kattugglor *(Strix a. aluco)* i Mellansverige.) Ragnar Edberg. 1958. *Vår Fågelvärld*, **17**: 273:280. (English summary.) An unusual number of Tawny Owls died during the late winter of 1955-1956 in the Province of Närke. This led to an investigation of, among other things, the mortality records of a taxidermist firm over a period of years. The analysis showed two peaks of mortality, one in the autumn and the other in late winter. The first appeared dependent on the hunting pressure plus other unknown factors, the second on the rigidity of the weather which presumably lowered the birds' resistance, and/or the depth of the snow cover which influenced the availability of food, i. e. small rodents. The late winter of 1956 was unusually harsh and the spring late; most of the owls that died during this period were starved. The following year the owl population of the region showed a drastic reduction due to this excessive mortality.—Louise de K. Lawrence.

NIDIFICATION AND REPRODUCTION

(See also Numbers 5, 25, 26, 27, 30, 34, 35, 40, 42, 46, 61)

18. Annual Mortality in a Banded Bobwhite Population. Halsey M. Marsden and Thomas S. Baskett. 1958. *Journal of Wildlife Management*, **22**(4): 414-419. This 7-year study is based on 1,546 banded Bobwhites *(Colinus virginianus)*. After October 1 of each year survival rates of both young and adults were the same. The 7-year average indicated annual populations composed of 82 percent young (average life expectancy of 8½ months). The oldest bird encountered in the study was shot in its 5th year. Annual mortality was as high in refuge areas as in hunted areas, indicating that hunting functions simply as an alternative cause of annual mortality.

Sex ratios, based on 961 birds captured from October to March to avoid bias of summer "cock-and-hen" trapping, showed an adult population composed of 63 percent males, a young population of 55 percent males. In both age groups this difference was statistically significant. No differential trap response was evident within either age or sex groups.

A regression analysis based on 1,124 recaptures gave an annual disappearance rate of 98.6 percent, of which 82 percent was attributed to mortality and 16.6 percent to egress.—Andrew A. Aratа.

19. The Shiny Cowbird and its Hosts, Especially the Rufous-collared Sparrow. (Vom brasilianischen Kuhvogel, *Molothrus bonariensis*, und seinen Wirten, besonders dem Ammerfinken, *Zonotrichia capensis)*. Helmut Sick and Johann Ottow. 1958. *Bonner Zoologische Beiträge*, **1**(9): 40-62. During his internment as an alien in 1943-44 on tropical Ilha Grande 80 kilometers southwest of Rio de Janeiro, Dr. Sick utilized his time in zoological studies. With the help of three companions he studied for two seasons the relationships between the Shiny Cowbird and its preferred host, *Z. capensis*. Of 93 nests of the latter, 57 (61%) held from 1 to 6 eggs of the cowbird, but of 32 nests of 9 other species, known elsewhere as hosts, only one had been parasitized. The cowbird population appeared to be rather nomadic and the authors believe that no female laid more than one egg in a nest. Like our Brown-headed Cowbird *(M. ater)* these females watched their victims' nest building, punctured some of the hosts' eggs and carried others away. Incubation period of the cowbird was 11 to 12 days, of the sparrow 12 to 13; fledging period of the former 12 to 15 days, of the latter 12 to 13.

Of 83 sparrow nests 51 (61%) were parasitized by 94 cowbird eggs; 41 of these hatched (44%) and 24 young were fledged—26% of all the cowbird eggs laid. Of 152 sparrow eggs 62 (41%) hatched and 37 young were fledged (24%). These figures for success are low in comparison to those of open-nesting passerines in temperate zones. I found in Ohio 35% success for 906 Song Sparrow *(Melospiza melodia)* eggs and 32% success for 113 Cowbird eggs. Post-fledging mortality of the cowbirds is high due to their conspicuous and fearless habits. This is a valuable contribution—a nesting success study from the tropics.—M. M. Nice.

20. Buzzards "nest-decorating" around a nestling on the ground. (Ormvråkar *(Buteo buteo)* utförande "bosmyckning" kring en på marken sittande unge.) Arne Johansson. 1958. *Vår Fågelvärld*, **17**: 351. (English summary.) A Buzzard's nest was partially destroyed during a storm in May 1957 and all but one of the three nestlings that fell on the ground were killed. When found, the nestling was still alive and in good condition. It sat beneath the tree surrounded by newly killed prey as well as several fresh pine boughs. A week later, the nestling had moved and here again the parents had "adorned" its sittting place with pine boughs. Still another week later, the nestling sat on a rock some 20 meters from the original pace, also here surrounded by "nest decor." To say that birds decorate their *nests*, whether with snake skins or evergreen boughs, is perhaps a misapprehension. Observation from a blind divulged the reason for the young Buzzard's constant moving. It simply walked into the shade each time the sun shone upon it.—Louise de K. Lawrence.

21. Further Notes on the Tufted Duck in St. James's Park, London. E. H. Gilham. 1958. *British Birds*, **51**(11): 413-426. Notes on the breeding and post-breeding populations of *Aythya fuligula* from 1953-57. Some females stayed with their broods after they themselves became flightless; others deserted them when they were a few days old. "In cold or wet weather they died quickly, but if good weather predominated during their first 14 days of life the survival rate was high." "The average mortality of ducklings was about 50% of all those known to have reached water and over half the total casualties were ducklings up to 7 days of age."—M. M. Nice.

22. Courtship, Hostile Behavior, Nest-establishment and Egg Laying in the Eared Grebe *(Podiceps caspicus)*. Nancy M. McAllister. 1958. *Auk*, **75**(3): 290-311. This detailed study of the breeding habits and behavior of the Eared Grebe is a welcome addition to the rather sparse literature on the subject. The author describes the species' courtship patterns, threat and escape attitudes, nest-building procedure, nesting behavior, and pays attention to its egg laying pattern (she has determined it to be an indeterminate layer). She notes a remarkable synchronization of the various stages of breeding within the colonial groups of nesting birds, particularly in the smaller colonies, and comments at length on its significance.—O. L. Austin, Jr.

23. Some Effects of X-irradiation on the Breeding Biology of Eastern Bluebirds. Robert A. Norris. 1958. *Auk*, **75**(4): 444-455. In the spring of 1956 the author exposed to X-irradiation some of the eggs and adult female and nestling *Sialia sialis* breeding in nest boxes on the Savannah River Plant area of South Carolina. Observations of the ensuing developments through the nesting season allowed him to conclude: "The breeding biology of irradiated and non-irradiated females was essentially the same in the following respects: size of sets of eggs, length of incubation, hatchability of eggs, nestling period, and general reproductive success. In both irradiated birds and controls there were records of second and third broods. Developing embryos were rather vulnerable to radiation. Among nine irradiated bluebird eggs (mean dosage about 420 r) the embryos died in three instances and the nestling produced died in three instances; the nestling hatching from the other three eggs succeeded in fledging. Four nestlings given 400 to 1200 r developed normally and fledged successfully. It is suspected that week-old songbirds might have greater radioresistance than laboratory chicks and ducklings of the same age." If this implies that perhaps wild birds may have a better chance than humans of surviving the next holocast, I don't begrudge it them one bit.—O. L. Austin, Jr.

24. The Gloss of Eggs. Nancy Wilson, Eric J. Preston, and F. W. Preston. 1958. *Auk*, **75**(4): 456-464. A specially devised gloss-meter shows a systematic tendency for the last egg of a clutch to be less glossy than the first egg in most species, but not in all. This parallels "previous findings that the last egg tends to differ in other respects, such as size, breadth, shape, and pigmentation." The authors do not comment on the possible biological causes or significance of these observed phenomena.—O. L. Austin, Jr.

BEHAVIOR

(See also Numbers 20, 22, 38, 46)

25. Behavior Studies on the Pied Flycatcher. Its Ethology and Ecology. (Verhaltensstudien am Trauerschnäpper. Beiträge zur Ethologie und Oekologie von *Muscicapa h. hypoleuca* Pallas.) Eberhard Curio. 1959. Beiheft 3 zur *Zeitschrift für Tierpsychologie)* 1-118. (With 4-page summary in English.) A remarkably thorough and well-documented contribution. A population was studied for 5 years near Berlin, most of the birds being color-banded—258 adults and 710 nestlings. Eight nestlings were reared by hand and a wild-caught pair kept in captivity. Artificial lengthening of daylight induced the reproductive mood in three of the young and in both adults.

Sixteen types of utterances are described as well as *Mischlaute* which are intermediate between two otherwise well defined types; apparently the bird utters these two notes simultaneously. "Motor pattern, causation, function and presumed evolution" of 6 social behavior elements are discussed and illustrated with line drawings and charts. "To a potential mate, the ♂ demonstrates its hole by rushing into it, uttering enticing calls." "In order to induce nest building activity in his newly acquired partner, the ♂ stimulates her by ritualized attacks, intention movements of hole-demonstration and by real hole-demonstrations themselves." During the egg stage the male feeds his mate 2.7 times an hour on the average, supplying her with about half her needed food. Pied Flycatchers in western Europe are single-brooded; those in Moscow double-brooded.

The female alone incubates. "The total time spent on the nest amounts to 71.1% (at 14.3 C) of the day. The ♀ leaves the eggs 55 times a day for periods of 5.0 min. after sitting for 12.1 min. (table 13). If the temperature falls, the ♀ increases the number of the daily periods on and off the nest and shortens the periods off more substantially than the periods on, so that a higher incubation time percentage results (fig. 38): 1° Celsius change in temperature results in a change of the total incubation time of 2.6%." "Berlin ♂ ♂ collect 41.5% of the nestlings food, but Finnish ♂ ♂ nearly 50% (table 17). ♂ ♂ eager in courtship feeding are more industrious too in feeding their brood (table 18). The feeding rate remains constant (at least) from the 8th day onwards up to the fledging stage (fig. 43). Berlin nestlings get 5.47 feedings per hour, whereas Finnish ones get only 4.82 feedings per hour (table 20). As the parents of the latter feed for 19 hours per day and those of the former only for 17.5 (table 21, fig. 45), nestlings of both the populations concerned receive nearly the same number of food parcels per day (table 20)."

These quotations give an idea of the wealth of material in this monograph. There is an extraordinarily wide coverage of the literature, much of it cited with the page reference, a most helpful and all too often neglected practice. The work closes with an index to authors and another to subjects and species. This study will prove a mine of information and inspiration to students of bird biology and behavior.—M. M. Nice.

26. Anticipatory Food-Bringing in the Prairie Warbler. Val Nolan, Jr. 1958. *Auk*, **75**(3): 263-278. This behavioral study of the food-carrying habits of the male *Dendroica discolor* to its incubating or brooding mate is followed by a theoretical discussion of the significance and probable origin of the habit. "Observations at five nests on the hatching day tend to prove that the male is unaware of hatching until he makes a food-bringing visit and that the behavior therefore functions to bring about the discovery and prompt feeding of the young by the male . . . his early assistance in feeding permits the female to

adjust her brooding schedule to weather conditions without sacrificing the nourishment of the nestlings. In favorable weather the advantage takes the form of a more rapid feeding rate, which should be conducive to the raising of larger broods. . . . A review of the 20 other species of wood warblers in which the male is reported to carry food or to feed the female before there are nestlings leads to the view that incubation feeding in his family has evolved from anticipatory food-bringing and that courtship feeding in three or four Parulids is but a later stage in evolutionary development."—O. L. Austin, Jr.

27. Pair Formation, Mutual Tapping and Nest Hole Selection of Redbellied Woodpeckers. Lawrence Kilham. 1958. *Aug*, **75**(3): 318-329. Describes pair formation, nest hole selection, and the early breeding cycle of *Centurus carolinus* from observations near Seneca, Maryland, beginning in early January and continuing until nesting starts in April. A novel behavior feature hitherto unnoticed in the woodpeckers is what the author calls "mutual tapping." In this "ceremony which may strengthen the pair bound and register agreement on the site of a nest hole, both members of a pair give slow, rhythmic taps . . . with the male inside his roost hole and the female outside, at dawn, and with both birds on bark outside of a hole about to be or being excavated."—O. L. Austin, Jr.

28. Tracking Birds on Tidal Flats and Beaches. C. Swennen and Miss G. van der Baan. 1959. *British Birds*, **52**(1): 15-18. Observations, illustrated with 12 photographs, of feeding behavior of shorebirds, gulls, and ducks on tidal flats, with notes on the prey animals. There is a marked difference between the efficient working methods of adults and the "stupid" behavior of young birds. Fledged Oystercatchers *(Haematopus ostralegus)* accompanied their parents and were fed by them.—M. M. Nice.

ECOLOGY

29. The influence of ecology on variation in the Mistletoe-bird *(Dicaeum hirundinaceum)*. Allen Keast. 1958. *Emu*, **58**(3): 195-206. The Mistletoe-bird occurs widely in all types of Australian forest associations, apparently in response to the ubiquitous distribution of its chief food, the berries of the parasitic mistletoe (Loranthaceae). Keast suggests "its virtual lack of geographic variation results from a well-developed food-nomadism and continuity of distribution. *Dicaeum* is the chief agent for disseminating the mistletoe plants, transporting them in its alimentary canal and shedding them with vitality unimpaired on branches where they can grow. Its mobility has apparently not, however, materially reduced the potential of the plants for developing geographic variation and undergoing speciation for the seeds can only be transported for distances of 30, and perhaps 60, miles at a time. This is insufficient to get most species across tracts of country from which the requisite host species or habitat is lacking. It also explains the absence of mistletoes from Tasmania."—O. L. Austin, Jr.

30. Ecology of the Clapper Rail in Southeastern North Carolina. David A. Adams and Thomas L. Quay. 1958. *Journal of Wildlife Management*, **22**(2): 149-156. This study of the Clapper Rail *(Rallus longirostris)* was conducted during 1955-56 in a salt water marsh at Southport, N. C. Of 30 nests, 23 were found in saltmarsh cord-grass *(Spartina alterniflora)*. Nesting continued from 1 April until 2 June, the largest number initiated between 15 and 28 April. Nesting success was 42 percent, and 10.5 eggs per nest yielded 9 chicks per successful nest. Parental care of young lasted 5 to 6 weeks and the young started flying at 9 to 10 weeks. Banding recoveries (4 percent) suggest that part of the local population is nonmigratory. A 5:1 ratio of juveniles to adults was obtained with both trapped (summer) and fall (shot) birds.—Andrew A. Arata.

WILDLIFE MANAGEMENT

(See also Numbers 5, 18, 30, 36, 44, 54, 55, 56)

31. Analysis of Variation Among Participants in Pheasant Cock-Crowing Censuses. Samuel M. Carney and George A. Petrides. 1957. *Journal of Wildlife Management*, **21**(4): 392-397. As would be expected, cock-crowing counts made by groups of people selected with no regard for previous experience showed very poor agreement. Two experienced counters produced results that were higher and more frequently in agreement than did four inexperienced people. Groups making counts on a single species obtained greater uniformity, regardless of species, than did a group counting the calls of Bobwhites *(Colinus virginianus)*, Mourning Doves *(Zenaidura macroura)*, and Pheasant *(Phasianus colchicus)* simultaneously.—Andrew A. Arata.

32. Evaluation of Ruffed Grouse Drumming Counts. Robert S. Dorney, Donald R. Thompson, James B. Hale and Robert F. Wendt. 1958. *Journal of Wildlife Management*, **22**(1): 35-40. A definite correlation of drumming transects with winter flush counts of Ruffed Grouse *(Bonasa umbellus)* was obtained on study areas in Wisconsin. Various aspects of the efficiency of drumming counts are discussed. The authors conclude that this method of obtaining indices of breeding populations of males is satisfactory.—Andrew A. Arata.

33. Distributions of Populations and Hunting Kill of the Canvasback. Robert E. Stewart, Aelred D. Geis, and Charles D. Evans. 1958. *Journal of Wildlife Management*, **22**(4): 333-370. This comprehensive report analyzes the banding returns of Canvasbacks *(Aythya valisineria)* available from all sources through 1956, and some returns from the 1957-58 hunting season. It presents numerous figures and tables of data on breeding and wintering populations, distribution of kill (total, sex and age, breeding ground derivation), migratory routes, and 10 maps showing the distribution of 381 recoveries of Canvasbacks landed in different areas.

Counts of wintering birds (1952-1956) varied from 384,000-669,000, averaged 508,000. About 80 percent of the population wintered in eastern United States and parts of Ontario. Wintering counts indicated occasional shifts in population between such regions as the Mississippi Valley and the mid-Atlantic region. Approximately 60 percent of the breeding population nests in the aspen parklands of Alberta, Saskatchwan, and Manitoba.

The kill was distributed as follows: United States (75%), Canada (24%), Mexico (1%); distributed primarily along the major migratory routes.—Andrew A. Arata.

34. A Study of Renesting in Canada Geese in Montana. Melvin G. Atwater. 1959. *Journal of Wildlife Management*, **23**(1): 91-97. Twelve geese were trapped on nests using a manually operated spring-type trap constructed from a Hancock beaver trap. Only the two trapped during the egg-laying stage renested. One of these renested twice, the first time at 0.3 mile and the second time at 0.1 mile from the first nest. About 2 weeks lapsed between the first and second nest and 1 week between the second and third nest. The second bird was trapped on a nest containing six eggs. The second nest was constructed on another reservoir 24 miles from the site of the first nest about 17 days after the initial nest was destroyed. Unsuccessful nesting pairs usually moved away from the original nest sites and remained by themselves, exhibiting restlessness and wandering. The data indicate that in the present study only a small percentage of the geese renested, but they suggest that nest destruction during the egg-laying stage may result in considerable renesting. More data are required to prove the latter point.—Helmut K. Buechner.

35. Significance of Ground Nesting by Mourning Doves in Northwestern Oklahoma. Robert L. Downing. 1959. *Journal of Wildlife Management*, **23**(1): 117-118. In an area where trees occupy less than ½ percent of the total area, approximately 70 percent of the Mourning Dove *(Zenaidura macroura)* population nested on the ground and produced 59 percent of the juveniles in 1956.—Helmut K. Buechner.

PARASITES AND DISEASE

(See also Number 23)

36. An Epizootic among Eider Ducks Involving an Acanthocephalid Worm. Gordon M. Clark, David O'Meara and James W. Van Weelder. 1958. *Journal of Wildlife Management*, **22**(2): 204-205. A number of dead Eiders *(Somateria mollisima dresseri)* picked up along the Massachusetts and Maine coasts were found to be heavily infected with an acanthocephalid worm, *Polymorpha botula*. One Eider yielded 610 worms. Examination indicated freedom from bacterial pathogens, and the incidence of other parasites was low. The deaths were attributed to the presence of *Polymorpha*.—Andrew A. Arata.

PHYSIOLOGY AND PSYCHOLOGY

(See also Numbers 23, 42, 45, 46, 56)

37. The Effectiveness of Aesthetic Factors with Vertebrates. (Die Wirksamkeit ästhetischer Faktoren bei Wirbeltieren.) Bernhard Rensch. 1958. *Zeitschrift für Tierpsychologie*, **15**(4): 447-461. A Jackdaw *(Corvus coleus)* and Carrion Crow *(C. corone)* preferred squares of paper with the "more regular, more symmetrical or rhythmical patterns. In most cases the percentage of preference was statistically significant." The same preference was shown by two species of monkeys. Fishes, however, always preferred the irregular patterns. "When choosing between two colours the jackdaw and the crow preferred gray and black, i.e. the colours of their own plumage. On the other hand, they preferred patterns with two or four different colours to simpler patterns of one colour or two colours respectively." The painting of apes and monkeys and songs of birds are discussed. The author concludes that optical and acoustic aesthetic factors are effective not only with man but also with other mammals and with birds, but not with fishes.—M. M. Nice.

38. Intelligence Tests with Tits. M. Brooks-King and H. G. Hurrell. 1958. *British Birds*, **51**(12): 514-524. Descriptions and illustrations are given of various ingenious contrivances by which peanuts could be procured by the solving of a problem. Blue *(Parus caeruleus)* and Coal Tits *(P. ater)* were very successful but Great *(P. major)* and Marsh Tits *(P. palustris)* and Nuthatches *(Sitta europaea)* never tried to pull out the pegs of the "perspex" apparatus. The last 2 showed no interest in the test situation but the Great Tits constantly watched the successful Blue and Coal Tits and at times robbed them of the booty.—M. M. Nice.

39. The Function of the Salt Gland in the Brown Pelican. Knut Schmidt-Nielsen and Ragnar Fange. 1958. *Auk*, **75**(3): 282-289. This is another in the series of intriguing papers by Schmidt-Nielsen and his collaborators on the importance of the nasal glands in sea birds as eliminators of salt from the water they drink. "The salt gland (nasal gland) of the Brown Pelican can excrete a highly concentrated solution of sodium chloride. The excretory capacity of the salt gland permits the bird to tolerate ingestion of sea water, and to profit from it because the salt is excreted in a concentration higher than in sea water. Quantitatively, the role of the salt gland in the elimination of sodium chloride is greater than that of the kidney."—O. L. Austin, Jr.

40. Incubation and body temperatures in the yellow-eyed penguin. Donald S. Farner. 1958. *Auk*, **75**(3): 249-262. This paper is a significant addition to the growing literature on body and incubation temperatures. The penguins' long periods of uninterrupted incubation and post-nuptual molts during which they go without food or water make their temperature phenomena of additional interest. Farner's measurements in *Megadyptes antipodes* show that incubation temperatures increased gradually "from 20-25° C. (68-70° F.) during the first two days to a maximum of about 38° C. (100.4° F.) at 15 days; this maximum was maintained throughout the remainder of the incubation period. The period of increasing incubation temperature coincides with the period of increased vascularization of the incubation strip." The maximum incubation temperature, reached at and maintained after the 15th day, does not differ significantly from

the body temperature of the incubating birds. He also found the body temperature of molting birds to be significantly higher, 38.6° C., than the 37.8° C. of non-incubating, non-molting birds. It would be instructive to have comparative data on the molting and incubation temperatures in such species as the Adelie and Emperor penguins, whose uninterrupted incubation periods are much longer (the full 64 days by the male Emperor) and whose molt periods are undergone under much more rigorous climatic conditions. Body heat loss on the shore ice during strong gales and sub-zero temperatures must be considerable during molt, and one suspects these birds' body temperatures must rise considerably to compensate for it. Much still remains to be done to determine the physiological mechanisms that regulate these temperature adjustments.—O. L. Austin, Jr.

41. On Regional Movements and Body Weight of Black-capped Chickadees in Winter. Louise de Kiriline Lawrence. 1958. *Auk*, **75**(4): 415-443. From the fall of 1948 to the spring of 1954 Mrs. Lawrence made 1279 weight records of 340 individual *Parus atricapillus* that she captured, marked, and released at her feeding station in central Ontario. Analysis of repeats and returns showed the presence of two populations, one transient, the other resident birds, between which no significant weight differences were apparent. "The factor most consistently influencing the variations in weight and fat deposition in the chickadees was the seasonal rise and fall of the mean temperature of the air. The influence of temporary cold or warm spells was much less consistent and often counteracted by other factors, such as migration, reproduction, and the food supply. The accumulation of fat in the greatest number of chickadees occurred in December and their highest weights were recorded in February. Increases in weight and fat were brought about chiefly by accelerated feeding. . . . The intimate interplay between the different factors influencing the changes in weight and fat of the chickadees is shown in this study. Any factor, even the most important, seldom maintained its modifying influence undisturbed for any length of time before another began exercising its counteracting pressure." This is an outstanding example of the sort of worthwhile study that can be made at a banding station with a limited population of birds.—O. L. Austin, Jr.

MORPHOLOGY AND ANATOMY

(See also Number 39)

42. The "Hatching Muscle" in the Chick. Harvey I. Fisher. 1958. *Auk*, **75**(4): 391-399. Recent workers have questioned the functionability of the "hatching muscle," M. complexus, which appears between the vertebral column and the dorsal surface of the head in the domestic chick at 7 days of incubation and supposedly motivates the egg-tooth, on whose widely accepted egg-pipping function they also have cast doubt. The muscle's development parallels that of the egg-tooth; it reaches its maximum size at 20 or 21 days of incubation and then gradually disappears. Fisher produces here experimental evidence, both anatomical and histological, that allows him to postulate "although the evidence is far from conclusive, my present belief is that the egg-tooth ruptures the shell at hatching and that M. complexus provides the power."—O. L. Austin, Jr.

43. Size differences between early and late autumn migrants of Dunlins at Ottenby. (Storleksskillnad hos genomsträckande kärrsnäppor *(Calidris alpina)* vid Ottenby.) Per Martin-Löf. 1958. *Vår Fågelvärld*, **17**: 287-301. (English summary.) The measurements used in this paper were obtained from 1,112 Dunlins, of which only a little over one percent were old birds. Methods and calculations are described in detail. Although no conclusions can be drawn with assurance and more clarifying work is planned in the near future, indications so far reveal that two populations may be involved among the Dunlins that pass over Ottenby during the fall migration.—Louise de K. Lawrence.

44. Sexing Live-Trapped Juvenile Ruffed Grouse. Walter L. Palmer. 1959. *Journal of Wildlife Management*, **23**(1): 111-112. Color of the bare skin on the upper eyelid was used in determination of sex with only 4 percent error. The error was further reduced by using other criteria of sex in combination with pigmentation of the eye-patch.—Helmut K. Buechner.

PLUMAGES AND MOLTS

(See also Number 40)

45. What makes the plumages of birds water-repellent? (Vad gör fåglarnas kroppsbeklädnad vattenavvisande?) Eric Fabricius. 1956. *Zoologisk Revy*, **18:** 71-83. (English summary.) Upsetting the author's *(Ornis Fenn.*, **22:** 33-45) earlier assumption that diet influenced the water-repellent properties of the plumages in young waterfowl, experiments with downy young Tufted Ducks *(Aythya fuligula)* showed that what they ate did not matter, provided their feathers were not soiled or disarranged by the feeding and/or the food.

Thence Dr. Fabricius goes on to establish the following facts: 1) the uropygial gland is functional from the moment of hatching in young Tufted Ducks but the existence of the secretion can, without injury to the birds, only be shown at death, when the powerful sphincter muscles which control it are completely relaxed; 3) the downy feathers of newly hatched ducklings are water-repellent in themselves, with out any oiling having to be effected either by the mother or some "innate agency"; 3) preening, the movements of which he analyses in minutest detail, is the chief agent preserving the waterproof quality of the plumage, less through the anointment with oil gland secretion, than by maintaining the fine structural organization of the barbules of the feathers. The most important preening movement is the chewing of each feather from base to tip. In an unsoiled and well-groomed plumage the constant distances between the barbules are thereby kept so small that water with normal surface tension cannot penetrate the webs. As soon as these distances are disturbed, however, for instance by handling the bird, the water is sucked in through the resulting apertures, replacing the air contained in the plumage, with as dire a consequence as if the bird had been ducked in oil. Oil, as known, has a much lower surface tension than water. Unfortunately, a weather catastrophe interrupted Dr. Fabricius' experiments, causing the death of all his test birds. Hence, despite this notable effort to clear up a baffling problem, he was unable seriously to challenge Dr. Elder's *(Wils. Bull.* **66:** 6-31) well-argued contention that ducks in the wild, deprived of their uropygial glands, eventually succumb.—Louise de K. Lawrence.

46. Growth and Development of the King Rail. Brook Meanley and Anna Gilkeson Meanley. 1958. *Auk*, **75**(4): 381-386. Describes the growth and development of *Rallus elegans* from hatching to first flight as observed in five birds reared in captivity. A table gives weights and measurements from hatching at irregular intervals up to 3 months, and pterylosis is described in some detail. The young start to fly apparently "with the completion of juvenal plumage development. Three of four captive rails flew at nine weeks, the fourth at eleven weeks." The authors describe four different calls in month-old rails: one "indicates general satisfaction and particularly, acknowledges the presence of others and notifies them of its presence," a second shows "relaxed comfort and sleepiness," a third "lonely dissatisfaction," and the fourth "expresses protest."—O. L. Austin, Jr.

ZOOGEOGRAPHY

(See also Numbers 29, 60, 61)

47. Our Harriers. (Våra kärrhökar.) Erik Rosenberg. 1958. *Vår Fågelvärld*, **17:** 302-303. This short article graphically gives the diagnostic field-marks of Sweden's four Harriers, *Circus cyaneus*, *C. macrourus*, *C. aeruginosus*, and *C. pygargus*. In text and with photographs, Sweden's keenest veteran bird watcher succeeds so well in his task that even the inexperienced ornithological sight-seer in Europe has no difficulty knowing the Hen Harrier from the Pallid Harrier by the black-edged wings in one and the wedge-like black patch at the tip of the wing in the other, nor the Marsh Harrier from Montagu's Harrier by the lifted pose of the wings in the first and the falcon-like form and beat of the wings in the last. When, added thereto, you read Rosenberg's vivid descriptions of movements and behavior, you get a record of high fidelity impressed upon your mind. —Louise de K. Lawrence.

48. Pallas's Warbler found in western Sweden. (Kungsfågelsångaren *(Phylloscopus proregulus)* anträffad i Bohuslän.) Ingemar Ahlin. 1958. *Vår Fågelvärld*, **17**: 331-334. (English summary.) The range of this small warbler extends over the southern parts of Sibiria south into the Tibet mountains. Only the nominate race *proregulus* migrates to southern China and Indochina. On 22 Oct. 1957 at least three of this species were observed in a garden in the Province of Bohuslän on the Swedish west coast. An adult male was collected. The kinglet-like appearance with the distinctive yellow rump and the characteristic habit of hovering in the air while catching insects led to the birds' certain identification. A first record of the species for Sweden.—Louise de K. Lawrence.

49. The Crossbill Invasion of 1956 and the Subsequent Breeding in 1957. F. R. Smith. 1959. *British Birds*, **52**(1): 1-9. A poor crop of spruce cones in Sweden in the spring of 1956 was followed by an invasion of *Loxia curvirostra* into Great Britain in the summer of 1956. Some of these remained and nested in 1957, but very few were seen after June.—M. M. Nice.

SYSTEMATICS

50. Remarks on the Taxonomy of Some American Doves. Derek Goodwin. 1958. *Auk*, **75**(3): 330-334. While acknowledging that "generic limits are largely a matter of opinion," the author recommends merging the genera *Zenaidura*, *Melopelia* and *Nesopelia* in the single genus *Zenaida* and presents logical grounds for this "lumping."—O. L. Austin, Jr.

51. Intraspecific variation in the Australian finches. Allen Keast. 1958. *Emu*, **58**(3): 219-246. A thorough taxonomic study and revision of the 18 species of Australian Estreldinae. Keast comments cogently on "Forms with the 'Potential' for Developing into New Species," "Geographic Barriers of Importance in Speciation," "Non-Evolutionary Variation—Clines," and "Species That Do Not Vary Geographically."—O. L. Austin, Jr.

52. Seasonal movements and geographic variations in the Australian wood-swallows (Artamidae). Allen Keast. 1958. Emu, **58**(3): 207-218. "The Australian wood-swallows provide a clear-cut demonstration of the significance of the different kinds of seasonal movements in the development of geographic races. Attention is drawn, in *A. leucorhynchus*, to the contrast between the negligible geographic variation occurring under continental conditions and the effects of insular isolation on the genotype, a wide range of strikingly different populations occurring in the islands beyond Australia."—O. L. Austin, Jr.

FOOD

(See also Numbers 28, 41)

53. Concealment and Recovery of Food by Birds, with Some Relevant Observations on Squirrels. T. J. Richards. 1958. *British Birds*, **51**(12): 497-508. An important paper based on observations on Coal and Marsh Tits *(Parus ater, P. palustris)*, the Nuthatch *(Sitta europaea)* and the Rook *(Corvus frugilevus)*, as well as on discussion of the relevant literature. The Grey Squirrel *(Sciurus carolinsis)* recovers its hidden nuts largely through smell. The tits and Nuthatch probably find most of theirs by foraging in the same localities where they stored their extra food. The remarkable efficiency by which the Thick-billed Nutcracker *(Nucifraga c. carycatactes)* retrieves its hidden stores is difficult to understand. The author emphasizes the important role played by birds in the reproduction and dispersal of forest trees.—M. M. Nice.

54. Gulf Coast Marsh Vegetation as Food of Wintering Waterfowl. J. L. Chamberlain. 1959. *Journal of Wildlife Management*, **23**(1): 97-102. Seeds were the most important food of 17 species of waterfowl examined except Blue Geese and mergansers. Analysis of seeds eaten, based on 1,251 gizzards, showed that *Cladium jamaicense*, *Eleocharis* spp., *Scirpus validus* and *Distichlis spicata* were the common foods. This study is valuable as background material for base manipulation of vegetation in the management of waterfowl.—Helmut K. Buechner.

55. Food Habits of the Mourning Dove in Missouri. Leroy J. Korschgen. 1958. *Journal of Wildlife Management*, **22**(1): 9-16. The crops of 2,000 Mourning Doves *(Zenaidura macroura)* collected in Missouri were examined. Seeds made up 99.2 percent of the total volume. The 10 most important foods (90.5 percent total volume) were included in 4 plant families: Gramineae, Euphorbiaceae, Leguminosae, and Compositae. Principal foods (May to September) are listed, and annual changes in diet noted.—Andrew A. Arata.

56. Food Requirements of the Golden Eagle. H. R. Fevold and John J. Craighead. 1958. *Auk*, **75**(3): 312-317. The authors fed three Golden Eagles *(Aquila chrysaëtos)* and one Goshawk *(Accipiter gentilis)* for a year experimentally to determine the amount of food necessary to keep the birds at a constant weight under various conditions of exercise and external temperature. From their data, presented in tabular form, they show that the weight of food the Eagle consumes (expressed in percentage of body weight) varies inversely with respect to both body weight of the bird and the environmental temperature, which is not entirely unexpected. While they were unable to determine the effect of exercise, they assume it would increase food consumption slightly. They show how these data "when related to other vital statistics of diet, raptor days, and average prey weights, can be used to estimate the number of prey animals of various species required to maintain these raptors in their environments."—O. L. Austin, Jr.

57. Food Habits and Available Food of Ovenbirds in Relation to Territory Size. Judith Stenger. 1958. *The Auk*, **75**(3): 335-346. "From examination of stomach contents, the food of the Ovenbird was found to consist chiefly of invertebrates gathered from the forest floor. These invertebrates are not taken selectively but are eaten in the approximate proportions in which they are available. The weight of invertebrates per litter sample within the territory varied inversely with the size of the total territory established during the breeding season. This correlation held within habitats, as well as among habitats. The weight of invertebrate food on the forest floor increased during the breeding season to reach a peak during the first two weeks of July, which correspond with the nestling period of the Ovenbird chicks."—O. L. Austin, Jr.

SONG

(See also Number 46)

58. The Nature and Characteristics of Sub-song. W. H. Thorpe and P. M. Pilcher. 1958. *British Birds*, **51**(12): 509-514. To one who made an intensive study of the spectacular course of development of song in the Song Sparrow (Nice, 1943) the 19 sound spectrograms in this paper of sub-song and full song in British thrushes and several other birds are of great interest. The exuberance, variety and indefiniteness of sub-song are clearly shown. Seven characteristics are given for sub-song, which "in young birds at least sometimes appears to be a form of 'practice' for the production of the full song."—M. M. Nice.

BOOKS

59. The Folklore of Birds. Edward A. Armstrong. 1958. London: Collins. Pp. xvi+272, illus. Price 30 shillings. (Also 1959. Boston: Houghton Mifflin. Price $6.50.) The subtitle of this New Naturalist volume is "An Enquiry into the Origin and Distribution of some Magico-Religious Traditions." Its content involves mainly the wild birds in Britain important in folklore and the emphasis is on oral—not literary—lore. It is a very scholarly work, tracing concepts and ideas about such topics as the seasons, weather, harvest, fertility, death, and so on, from the present time far back into pre-history. Many concepts are discussed on at least a Holarctic basis. The following fragments, lifted out of context, give some idea of the scope of Armstrong's life-long interest in the subject:

"The increasingly rapid spread of industrialism and the standardisation of modes of thought due to modern means of communication are now eliminating ancient beliefs and practices over most of the world and consequently geographical distribution of folk tradition is becoming obscured." (p. xi)

"Folk thinking is associationist rather than logical. Like our dream thinking it is careless of contradictions. Probably both types of thinking are therapeutic because in them the highly buried, partly repudiated, past finds expression." (p. 84)

"A great mass of evidence ranging from Palaeolithic art to the aetiology of mythology suggests that animal or theriomorphic gods preceded anthromorphic gods; or to put it more accurately, that man thought of supernatural powers in terms of animal qualities before he pictured God in his own image." (p. 91)

"People are apprehensive of anything which appears to have human qualities without being human. Not only does the binocular vision of owls give them a resemblance to humanity but also the calls of some species are quasi-human." (p. 113.)

"It is possible for types of literary folklore to have a prolonged history in a country without influencing its oral folklore. Rather rarely literary folklore is accepted in oral folklore or the two cross-fertilise each other." (p. 118.)

". . . the eagle or anserine bird in early symbols nearly always represents sky powers, often the sun, but sometimes, especially in the case of the eagle, storm powers, thunder or lightning . . . , the fish and snake represent darkness, earth and water, the chthonic forces. Often the latter are sexual symbols Their ambivalence is thus explained, for sex involves attraction and repulsion. The elaborate courtship displays of birds are known to have evolved through the conflict of these drives. Human sexual and social activities have a similar foundation." (p. 139.)

". . . irrational notions sometimes serve a useful purpose, enabling people to live more integrated lives than they would be able to do without them." (p. 185).

"Poets have been glad to use bird images, as Shakespeare used the eagle and the owl, because they were already saturated with symbolical meaning, but they have seldom succeeded in endowing a bird or other animal with sufficient emotional significance for it to become a popular symbol." (p. 188.)

"Those who try to assess the signficance of what folklore has preserved are chary of assuming that previous generations were more foolish than their own. The continuity of tradition which we have found exemplified in this survey has provided a foundation enabling the bolder minds of successive generations to pioneer new ways of thought, and new modes of life without undermining the foundations of society. Conservatism is society's safeguard against revolution and disintegration. Many a neglected fable teaches that we despise the past at our peril. Wisdom is justified of all her children." (p. 237.)

Considering the author's self-imposed limits of coverage, the American reader —naturally—will find nothing on hummingbirds, or superstitions concerning the Gray Jay *(Perisoreus)*, and so on. But probably any reader will find that this book evokes memories of things taught or heard in childhood, or discussed in most serious fashion by fishermen or people in rural areas; this may cause some to wonder as to the extent of their misfortune in being conditioned against perpetuating the folklore they have received. Such as: it is bad luck to kill a Robin *(Erithacus,* transferred to our *Turdus)*; on hearing an owl, one should tie a knot in the corner of a sheet to forestall illness; that there is a deep-seated reason why some people nail a dead owl to the barn; the interest in the first swallow in spring; etc. Such are the surface phenomena; this book explains what lies underneath.—R. S. Palmer.

60. Bird Life throughout the Year. (Swiss Bird Life, Volume 1). (Das Vogelleben im Jahresverlauf. (Schweizer Vogelleben, Band 1).) Hans Noll. 1958. 2nd ed. 16 line drawings; 32 photographs. Basel. Wepf. 160 pp. A delightful and efficient guide to bird watching. The 6 chapters are as follows: Winter and winter guests from the bird world—December through February; Towards spring—February, March; Return of old acquaintances—March through May; High time in bird life—May, June; Quiet time, molt, and departure of our breeding birds—July, August; Migration, and return of winter guests—September through November. There are 3 appendices. Fifty-four of the regular and more common winter guests are each described and their distribution noted. Three pages are devoted to average arrival dates of the commoner breeding birds with notes on their habitats. Finally there is a most useful breeding-time calendar of the commoner and well-known species—75 in all. These are divided into

6 habitats and the following information given: dates when nests or young can be expected; position of nest, size of set; reliable incubation and fledging periods, and number of broods. The book concludes with a subject and a species index.

This volume is written with charm and clarity by an ornithologist of long and wide experience. It is well designed to prove a guide "to these lovely creatures that neither sow nor reap, but live their lives simply and gladly, as each day comes, without worries and without cares."—M. M. Nice.

61. The Bird Life of Great Salt Lake. William H. Behle. 1958. University of Utah Press, Salt Lake City. 203 pp., ill. Price $4.50. This is a semipopular dissertation, as the subtitle states, on the "Life History, Ecology, and Population Trends of the California Gulls, White Pelicans, Double-crested Cormorants and Great Blue Herons, together with an account of the Bear River Migratory Bird Refuge." It contains an excellent historical sketch of the lake's bird colonies and good accounts of the nesting behavior, food habits, and general biology of the four species principally involved. As a comprehensive study, however, the work strikes me as a bit haphazard. The omission from the 12-page bibliography, for instance, of references cited in the text (I looked in vain for the titles of Lockerbie's 1943 and 1946 papers mentioned on page 28 and the Akker and Wilson reference on page 174) suggests it is not as complete as it might have been. The factual information it presents seems a bit old, and the use made of the available banding data is far from exhaustive.

Delays between the completion of field work and the publication of results are inevitable, but this volume published in 1958, with papers cited in its bibliography up to 1956, gives banding "returns" only to 1953 and no population figures for the colonies later than 1949. The islands are obviously difficult to reach; they lie 20 to 70 miles from Salt Lake City (a scale of miles on the map would have been helpful), and transportation to them over the large, shallow, and excessively salty lake is, I understand, hard to obtain and always uncertain. Nevertheless one cannot help wondering what the current status of these fine bird colonies is, and what if any attention has been given them since the author last visited them, ostensibly 10 years ago.

In commenting on his banding results Behle does not differentiate between the terms recovery and return and uses the two indiscriminately for either category, which is at times quite confusing. Also perplexing in his discussions of population dynamics is his inattention to the statistical possibilities of the mass of banding data available to him. This is particularly manifest in the account of the California Gulls, for which up to 1953 he had at least 260 "returns" from birds banded as juveniles, the oldest of which had reached the age of 12 years, and whose worn band "which probably would not have lasted more than another year or two" leads him to comment "Hence there are limitations to ascertaining longevity by means of banded gulls." There are limitations indeed, but that is no reason for neglecting what the data can be made to show. Certainly a random sample of 260 birds of known age up to 12 years should be adequate for calculating the species' mortality and survival rates and potential life span.—O. L. Austin, Jr.

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